

NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

**COST BENEFIT ANALYSIS OF ENTERPRISE RESOURCE
PLANNING SYSTEM FOR THE NAVAL POSTGRADUATE
SCHOOL**

by

Liza A. Rosa

June 2002

Thesis Advisor:
Co-Advisor:

William Gates
Julie Carpenter

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This thesis reviewed and evaluated the ERP Solution System currently in the Integration Testing Phase at NAVAIR and examined the benefits and cost that NPS could leverage by purchasing the system for approximately \$2.7M for 200 users or \$3.1M for 500 users. This thesis looked at the capabilities of the current NAVAIR SIGMA ERP Solution System, in terms of money and level of expertise. The research also looked at the alternatives and options to enable NPS to close the gaps to fit its current needs.

RADM David Ellison, Superintendent, wanted to explore the possibility of joining NAVAIR's ERP Solution System, currently under the Integration Testing Phase, as he believed it was an opportunity for NPS to leverage on this technology. As seen by senior management, the partnership with NAVAIR could benefit NPS, by acquiring and implementing an ERP at a fraction of the cost normally associated with this type of purchase. An additional benefit would be reducing the time associated with implementing an ERP System, normally between 3 and 5 years, to 11 months. Management also saw the advantage of benefiting from NAVAIR lessons learned, partnering with an activity that was familiar with ERP in a Navy setting, and conducting joint training.

It was determined by the research that by purchasing an ERP system, NPS in the long run, would realize savings by reduced labor cost, decreased funds spent on NPS homegrown system and access real time reports which would eliminate account balances discrepancies.

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SYSTEM FOR THE NAVAL POSTGRADUATE SCHOOL**

Liza A. Rosa
GS-12, United States Navy
B.S., Nova University, 1988

Submitted in partial fulfillment of the
requirements for the degree of

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June 2002**

Author: Liza A. Rosa

Approved by: William Gates
Thesis Advisor

Julie A. Carpenter
Co-Advisor

Douglas A. Brook, Ph.D.
Dean, Graduate School of Business and Public Policy

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I. INTRODUCTION

A. AREA OF RESEARCH

This research reviews and evaluates the ERP Solution System currently under the Integration Testing Phase at NAVAIR to examine the benefits and cost that NPS could leverage by purchasing the system for approximately 2.7M for 200 users or 3.1M for 500 users. The research will look at alternatives and options to close possible gaps.

B. RESEARCH QUESTIONS

1. Primary Research Question

Given the capabilities of the current ERP System in terms of money and level of expertise what are the possible alternatives to close the gap to enable it to fit NPS's current needs?

2. Secondary Research Questions

- What is the background and history of ERP?
- What other Universities use ERP?
- What is the level of training that NPS will need to support ERP?
- What are the direct costs of acquiring ERP, leveraging on NAVAIR's savings?
- What are the indirect costs of acquiring ERP, leveraging on NAVAIR's savings?
- What are the current capabilities?
- What are the direct costs to maintain NPS's current systems?
- What are the indirect costs to maintain NPS's current systems?

C. DISCUSSION

An Enterprise Resource Planning System is a packaged business software system that lets a company automate and integrate the majority of its business processes, share common data and practices across the enterprise, and produce and access information in a real-time environment. The NAVAIR Commercial Financial Practices Working Group was chartered by RBA EXCOMM (Revolution in Business Affairs Executive Committee). Their mission was to identify the vision and goals of financial management and to specifically address the following:

- Consolidate and prioritize current financial management initiatives and progress to serve as a foundation for future reform
- Accelerate the Department-wide introduction and use of appropriate commercial financial practices and reporting
- Develop a strategic plan for implementing a business management process that will enable DON decision-makers to assess cost and performance
- Establish a plan and architecture to implement reforms
- Realizing that this encompassed more than financials, the Revolution in Business Affairs Executive Committee changed their name to Commercial Business Practice Working Group to look past best financial practices and look toward best business practices. As envisioned by the Commercial Practices Working Group ERP would:
 - Provide improved decision quality information to all levels of management
 - Improve efficiency and effectiveness (better, faster, cheaper) through reengineered business processes and integrated information to managers
 - Manage costs for maximum reallocation of resources to re-capitalization and modernization and enable compliance with statutory requirements: Government Management Reform Act (GMRA), Government Performance and Result Act (GPRA), Chief Financial Officer's Act (CFO Act), etc.

The proposed plan at NAVAIR was to prove ERP effective on a small scale via pilots. Using this approach, they hoped to channel existing resources, apply lessons from industry, leverage ongoing initiatives, manage risk, and commission the Executive Steering Committee to oversee the initiative.

The Naval Postgraduate School is considering the NAVAIR SAP solution because after NAVAIR conducted an independent product review of all available ERP software package products, they selected SAP. NPS would leverage from the NAVAIR SAP solution in that it would allow NPS to:

- Reduce the impact on NPS personnel resources during the 11-month effort
- Take advantage of NAVAIR lessons learned, personnel, workshops, and documentation
- Demonstrate tangible results in a very short timeframe at a reduced cost

D. SCOPE OF THE THESIS

The scope includes: (1) A review of the history of Enterprise Resource Planning and NAVAIR current pilot programs, (2) A review of commercial businesses who have successfully used and implemented ERP into their business processes, (3) Analysis of the Gap/Fit Findings with specific areas the design team will focus on, (4) An examination of the Gap/Fit Findings functionalities and their applicability to NPS, and (5) Development of a process innovation approach given the current capabilities of the system, recommend possible alternatives to close gaps.

E. METHODOLOGY

- Conduct a literature search of books, magazine articles, CD-ROM systems, government reports, Internet based materials, and other library information resources
- Review the NAVAIR Pilot SAP for lessons learned in an effort to gauge the probability of success for NPS
- Gather cost data and relevant information to provide an alternative solution to gaps given our current capabilities
- Conduct interviews, either in person or by telephone with members of the KPMG Consulting Group and NAVAIR SAP project members, and members of the NPS IT Community

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II. BACKGROUND

A. HISTORY OF ERP

What is Enterprise Resource Planning?

An industry term for the broad set of activities supported by multi-module application software that helps a manufacturer or other businesses manage the important parts of its business, including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service, and tracking orders. ERP can also include application modules for the finance and human resources aspects of a business. Typically, an ERP system uses or is integrated with a relational database system. The deployment of an ERP system can involve considerable business process analysis, employee retraining, and new work procedures. [Ref. 23]

The aim of ERP, according to Koch, Slater, Baatz 1999, is to integrate all departments and functions across a company into a single computer system that can serve all those different department's particular needs. [Ref. 16] ERP software tries to include functionalities to help of finance & accounting, human resources, and often supply/warehousing in one application. ERP combines the optimized applications of each department into a single integrated application that runs off a single database.

There are many reasons that a company would use ERP, however, two of the main reasons are:

- **Integrating financial data** – When all financial data is stored in one place, it eliminates irregularities and gives the owner of the company an accurate picture.
- **Standardizing the manufacturing process** - Standardizing processes can increase productivity especially when different processes are used to produce the same outcome.

Historically, manufacturing was complex, yet simpler than the numerous hardware and software choices that confront manufacturers' today. Process, quality, and price were the primary concerns of both the buyer and the seller. As more products became available, convenience was added to the mix. If a local manufacturer had good quality and a reasonable price, that company could secure the job over some far away company who might have a better price. Trains, trucks and commercial transportation

also changed the situation somewhat. However, in-spite of the changing transporting trends, buyers would try to find products that were closer to their locale to cut down on shipping and/or transporting costs. On the other hand, to make up for higher shipping cost, the seller would strive for a better system to provide better quality, better price, better customer interfaces, and better supply chain management.

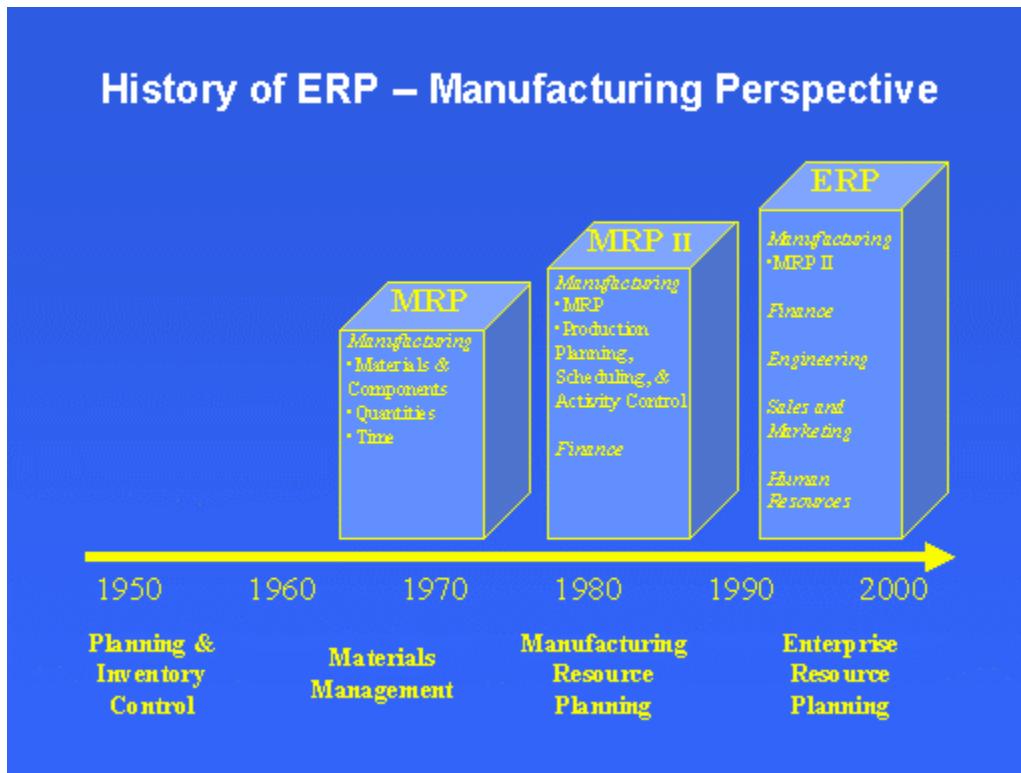


Figure 1. History of ERP.

In the 1960's, the focus was on inventory control. Most of the software packages (usually customized for a specific type of hardware from a specific vendor) were designed to handle inventory based on traditional inventory concepts.

In the 1970's, focus shifted to MRP (Material Requirement Planning). Many companies kept raw materials in stock and had a simple re-ordering system: if the inventory dropped below a minimum stocking quantity or re-order point they would buy

more inventory, usually using a re-order quantity. The system worked well for most companies, since product changes and production plans remained constant.

In the 1980's, the concept of MRP-II (Manufacturing Resources Planning) evolved, which extended to shop floor and Distribution management activities. These systems would forecast shortages and ordering times for components and other raw material based on base sales and marketing data.

In the early 1990's, MRP-II was further extended to cover areas like Engineering, Finance, Human Resources, Projects Management and the overall activities within a business enterprise. Hence, the term ERP (Enterprise Resource Planning) was coined. In addition to system requirements, ERP addresses technology aspects, like client/server-distributed architecture, and object oriented programming. These are based on the idea that seamless integration is essential to provide visibility and consistency across the enterprise. Prior to ERP systems, companies stored important business records within many different departments. Each department often used different systems and techniques to manage that information. Within an organization, information was often duplicated without necessarily being identical or similarly up-to-date. The unified nature of an ERP system can lead to significant benefits; including fewer errors, improved speed and efficiency, and complete access to information. If a manager or an employee has better access to information, they better understand what is going on in the enterprise so they make better business decisions.

An information system to utilize all the data available can improve all the functions related to a manufacturing company. Both shop floor workers and executives need a different view of that data for long-range planning and short-term deployment. Data mining and data warehousing applications involve this aspect of information development. Databases are becoming larger and larger as companies find more and more data to store. ERP strives to combine the needed functions of every application a company requires to do its job and integrate them all together. It facilitates intelligent resource planning in the face of rapidly changing constraints, such as materials availability, market readiness, plant capacities, personnel certification and business costs per location.

ERP accomplishes this objective by modeling business processes. For example, an ERP tracks a sales order from the order desk through production planning, purchasing, production, warehousing, and shipping/accounts receivable. An ERP will also help identify the impact order has on other departments; an example would be purchasing and production, to determine additional material and capacity requirements to fulfill the order.

1. Major ERP Players

- A few large companies, including, dominate the ERP market:
 - SAP AG
 - Baan
 - Peoplesoft
 - J.D. Edwards
 - Oracle

a. SAP AG

SAP, which actually the name of this German company is a leading provider of enterprise resource planning software to integrate back-office functions; distribution, accounting, human resources, and manufacturing. More than 15,000 companies, including Chevron, Texaco, Sony, and GM use its software. SAP hopes to lure its huge customer base to mySAP.com, an exchange that host's applications for marketing and customer support functions. The company continues to expand its product lines, pushing into supply chain and customer relationship management applications, a move that intensifies its competition with companies such as I2, Oracle, and Siebel Systems. Three of its founders control about 40% of SAP. The last twelve months sales are reported at 6.43 billion, with a net income of 722.50 million.

b. Oracle

The company is a leading provider of systems software, including database management, application development, and application server software. Its Oracle9i database management software is used by companies to store and access data across numerous platforms. The company has expanded past its legacy database products into online services and business applications, including supply chain and human resource management applications; Oracle is also taking aim at Siebel Systems on the

customer relationship management software front. Consulting and support services account for nearly 60% of sales. Chairman and CEO Larry Ellison own 24% of Oracle. Sales for the last twelve months are 10.54 billion, with a net income of 2.5 billion.

c. *PeopleSoft*

The company is a leading provider of enterprise applications that tie together customers' back-office operations. Its software addresses such tasks as accounting, human resources, manufacturing, and supply chain management. Consulting, maintenance, and training account for about two-thirds of sales. While a move into customer relationship management software has rekindled licensing sales growth and helped offset a slowdown in the broader enterprise software market, it has also exposed PeopleSoft to more direct competition with companies such as Oracle and Siebel Systems. Co-founder and chairman Dave Duffield owns 13% of the company. The last twelve months sales are reported at 2.07 billion, with a net income of 191.60 million.

d. *J.D. Edwards*

A maker of enterprise and supply chain software, the company's products manage an array of functions; human resources, accounting, logistics, supply chain management, and manufacturing. J.D Edwards' software is used by more than 6,000 customers (including Casio Computer, IBM, and BMW) in a variety of industries. These include automotive, life sciences, and consumer packaged goods. The company has moved to leverage its legacy enterprise and supply chain software into Web-based applications, including collaborative commerce software and services. Co-founder Edward McVaney and his family own about 25% of the company. The last twelve months sales are reported at 856.90 billion with a net income of negative 179.50 million.

e. *Baan*

Baan develops software solutions and services which help companies do business in the 'networked economy' - where information, integration and Internet collaboration are ever more important. Baan was founded in 1978 in The Netherlands. Since then, the company has built early expertise in software for the manufacturing industry to become a leading developer of innovative, integrated software solutions for every major area of business today. Baan helps industrial enterprises optimize their enterprise performance strategies and compete in the knowledge-driven 'networked

economy' with its ever-increasing demands for information, integration, and collaboration. Through its open and powerful iBaan suite of Internet-enabled solutions, Baan is ideally placed to support organizations in the manufacturing, logistics, services, and engineering industries as they move towards tighter integration of their complex processes, closer collaboration throughout their value chain, and greater accessibility of cross-enterprise transactional and analytical information. Baan has more than 15,000 customer sites worldwide and is part of the Production Management division of Invensys PLC. Baan has not published sales or net income.

B. IDENTIFYING PRIVATE SECTOR ORGANIZATIONS CURRENTLY USING ERP

Over the past decade, corporate information technology (IT) has been moving from "legacy systems" comprised of departmentally based off-the-shelf software and custom-coded applications to standardized ERP. SAP is the largest supplier of enterprise software in the world, and it has now developed a version of its R/3 client-server software for the public sector. The following is a list of private sector companies currently using ERP:

Ericsson	Bausch & Lomb	BP	AT&T	AVNET	BBC	Lockheed Martin
Circuit City	Nabisco	GAZPROM	EXXON	GE	Compaq	BGE
The Gillette Company	IBM	Motorola	Shell	Boeing	BASF	Disney

Table 1. Private Sector Currently Using ERP.

In addition to the private sector using ERP, the SAP American University Alliance program offers universities software and staff training that normally cost businesses hundreds of thousands of dollars. SAP provides the training version of R/3, which simulates a business environment and enables students to experience real-time management of complex information driven company that manufactures and sells worldwide. Since R/3 integrates information systems within the company and interfaces with suppliers and customers, it also provides instructors with a tool that integrates

business education across disciplines by, for example, allowing finance students to see how customer order management, procurement, manufacturing and human resource management interface with financial reporting. The University Alliance not only gives instructors a cross-functional teaching tool, it gives students access to advanced software technology that enhances their marketability, and it gives firms, employees who understand how business areas interrelate and have specific IT skill sets. The following is a chart of all the universities currently enrolled in the program:

SAP America University Alliance Members - August 2001	
Anne Arundel Community College Arizona State University Auburn University Beaver College Bentley College California State University - Chico California State University - Dominguez Hills California State University - Fullerton Central Michigan University Clarkson University Cleveland State University Delaware County Community College DePaul University Drexel University Fairfield University Fairleigh Dickinson University Florida Atlantic University Florida International University Fordham University Georgia Institute of Technology George Mason University Georgia Southern University Grand Valley State University Harvard Business School Houston Baptist University Indiana University Indiana University of Pennsylvania Indiana University, South Bend John Carroll University La Salle University Lincoln University Louisiana State University Marist College New Jersey Institute of Technology Northern Arizona University Northern Michigan University Pace University Purdue University Purdue University - Computer Technology Department Rensselaer Polytechnic Institute Rider University Rochester Institute of Technology Rutgers University Camden	Stetson University Syracuse University Temple University Texas A & M Texas Tech University The College of New Jersey The College of William and Mary The Pennsylvania State University University Park Behrend College Great Valley Towson University Tulane University University of Arkansas University of Arizona University of California - Irvine University of Cincinnati University of Colorado - Denver University of Dayton University of Delaware University of Florida University of Georgia University of Illinois at Urbana - Champaign University of Louisville University of Michigan-Dearborn University of Mississippi University of Missouri System: Columbia Kansas City Rolla St. Louis University of Nebraska Lincoln Omaha University of North Carolina - Chapel Hill University of North Carolina - Greensboro University of Pennsylvania The Wharton School Organizational Dynamics Program University of Scranton University of Southern California University of South Dakota University of St. Thomas University of Tennessee - Knoxville

Newark	University of Texas - Arlington
New Brunswick	University of Texas - Dallas
Salem State College	University of Toledo
Sam Houston State University	University of Wisconsin - Milwaukee
Santa Clara University	Villanova University
Savannah State University	Virginia State University
Southeast Missouri State University	Virginia Commonwealth University
Southern Illinois University, Edwardsville	Wichita State University
St. John's University	Widener University
St. Joseph's University	

University Alliance Members - SAP Canada - July 2001

Algonquin College	McMaster University
Athabasca University	Ryerson University
Brandon University	Southern Alberta Institute of Technology
British Columbia Institute of Technology	Seneca College
Carleton University	St. Francis Xavier University
Centennial College	St. Mary's University
Collège LaSalle	Université de Sherbrooke
École des Hautes Études Commerciales -	Université du Québec
Université de Montréal	University of Calgary
École de Technologie Supérieure	University of New Brunswick
École Polytechnique - Université de Montréal	University of Windsor
Humber College	
McGill University	

University Alliance Members - Latin America - August 2001

Instituto Technologico y de Estudios Superiores de Monterey	Instituto de Estudios Superiores de Administracion (Venezuela)
Campus Monterrey	Universidad Metropolitana
Campus Cd. de Mexico	Pontificia Universidad Javeriana in Santafe de Bogota
Campus Edo. de Mexico	Universidade ICESI, Cali
Campus San Luis Potosi	Faculdade de Informatica e Administracao Paulista (FIAP)
Campus Guadalajara	Universidade do Vale do Rio dos Sinos (UNISINOS)
Campus Laguna	Federal University of Brasilia (UnB)
Campus Toluca	Universidade Adofo Ibanez
Campus Queretaro	Universidad Catolica de Valparaiso
Campus Mazatlan	Universidad de San Andres
Federal University of Rio De Janeiro	Universidade do Sul de Santa Catarina (UNISUL)
GPI COPPE	
Universidad de Santiago	
Engineering School of Sao Carlos - University of São Paulo	
ITA	
SENAI Bahia	
Unicentro Newton Paiva	

University Alliance Members - User Groups - July 2001

ASUG
Central Michigan Student User Group

Table 2. University Alliance Members.

C. HISTORY OF NAVAIR ERP SAG PILOT PROCESS

The Naval Air Warfare Center Commercial Financial Practices Working Group was chartered by the Revolution in Business Affairs Executive Committee. Their mission was to identify the vision and goals of financial management. The team specifically used the Business Process Reengineering (BPR) Model. The group felt that BPR was a key element of their overall corporate strategy. Specifically, it would lower the cost of doing business and reduce the cycle time in responding to their customer's needs. The teams then provided a disciplined approach to improving performance by applying a consistent methodology for defining process deficiencies, setting up performance targets, redesigning processes and supporting the decision process. Changing the process would produce significant returns on investment both for the team and the Department of Navy (DON), by reducing reliance on Commercial Activities studies. Overall BPR would reduce NAVAIR's cost by integrating the key processes that span across multiple competencies and their sites.

Next, the group decided to improve performance by conducting Functionality Assessments on their Acquisition Management Divisions, Testing & Evaluations Divisions, Depot Management, Engineering Investigation Divisions, Software Development and Asset and Property Management. The group felt that by coupling the Functionality Assessments with ERP they would drive change, and enable reengineering efforts for the DON. Specifically ERP would enable the following:

- Integrate Naval Aviation value chain, allowing for reduced inventory levels and Aviation Depot Level Repair (AVDLR) costs
- Automate and integrate business processes
- Share common data and processes across the entire organization, reducing legacy systems and cost
- Provide consistent information for improved decision-making and performance metric, reducing non-value work
- Make total costs visible across the departments

Five Business Functional Areas were then identified to guide the team:

- Financial Management: All financial activities, including budgets, funds management, billings, payables, reporting and employee data

- Procurement Management: All buying activities for Maintenance, Repair and Overhaul (MRO) items, including issuing Projects Orders (PO), receipts of goods and processing vendor invoices
- Asset Management: Real and property improvements. Tracking all assets from acquisition to disposal
- Project/Program Management: Fully integrated project management system and linking together project management tools with finance, budgeting, procurement, and asset management data
- Strategic Management: Planning and budgeting tool for both annual and long range planning. Objective was to build upon annual budgeting/planning needs to develop a long range orientation for Space & Naval Warfare Systems Center San Diego (SSC-SD)

The Revolution in Business Affairs Executive Committee then sponsored 4 DON wide ERP pilots to demonstrate and evaluate different DON functional requirements:

- (SIGMA) NAVAIR Program Management. ERP project would explore Program Management Processes using SAP, including linkages between contracting and financial systems
- (SMART) Naval Supply Systems Command (NAVSUP)/NAVAIR Aviation Supply Chain/Maintenance Management. This ERP project would explore maintenance planning and material ordering processes using SAP
- (CABRILLO) Space and Naval Warfare System Command (SPAWAR) Warfare Center Management. ERP project would explore the financial management process. The top level objective of this program would be to eliminate existing internal business systems and interfaces to the maximum extent possible.
- (NEMAIS) Naval Sea Systems Command (NAVSEA/CLF) Regional Maintenance. ERP project would explore improving the workforce management

The top-level objective of the ERP Pilot program was to eliminate existing internal business systems and interfaces to the maximum extent possible. The committee envisioned a single source data entry system to eliminate data redundancy and improve data integration. The system would also be Chief Financial Officer (CFO) compliant to provide Navy Management an order of magnitude improvement in business information, with an associated significant reduction of infrastructure costs.

Another goal was to reduce the number of organizations involved in doing the same process hence, increasing accountability, decreasing the long cycle times to

accommodate multiple hands off and decreasing high inventory levels. The ultimate goal was integrating all of the external and internal systems.

As envisioned by the Committee, the Pilots would establish and maintain the following:

- Ability for program managers to budget, plan, track execution, and measure performance across the DON
- Ability to track configuration and assets across the DON
- Better cost visibility and more agile execution
- Ability to track financial execution across the general fund and Navy Working Capital Fund
- Document tracking for milestone decision preparation
- Fixed assets management (depreciation for Navy Working Capital Fund)
- Ability for management to roll up financial performance and asset visibility
- Ability to order Military Standard Requisitioning & Issue Procedures (MILSTRIP)
- Ability for planning work, capacity loading, and schedules with the competencies (workforce planning out human resources module)
- Support employee self service (locator information)
- Reduce turn around time for time sheet adjustments
- Verify that the three company code structure supports the team financial requirements

D. IDENTIFYING GOVERNMENT AGENCIES CURRENTLY USING ERP

1. National Aeronautics and Space Administration

The breadth and depth of requirements for enterprise resource planning at federal agencies and the way the federal government does its accounting are two good reasons why examples of ERP do not jump out in the public sector. [Ref. 22] For starters, there are very few agencies putting in place a complete ERP system, one that, in the words of IBM Corporation, “automates and integrates business processes and provides the data stream for business analysis”. [Ref. 22] When you do find one, for example, at the National Aeronautics and Space Administration, it is likely to be under a different name. In this case, it is (IFM) for integrated financial management. New York-based contractor KPMG is the vendor tasked with putting the system in place through a 1997 contract

worth \$186 million. NASA's effort is the most complex ERP system in the entire federal government, according to Lee Holcomb, Chief Information Officer.

If you went out today, looking at what we would like to do with IFM, you could not find a single vendor that could fulfill the full requirements of the federal sector," said Holcomb. [Ref. 22] According to industry and government officials the requirements in the federal sector that are at issue but the difference in the way the federal government does its accounting vs. the way it is done in the private or not-for-profit sectors. [Ref. 22]

The mission of the IFMP is to improve the financial and human resources management processes throughout NASA. IFMP will re-engineer NASA's business infrastructure in the context of industry "best practices" and implementing enabling technology to provide necessary management information to support the Agency's strategic plan implementation. To accomplish its mission, IFMP has identified the following business objectives that are characterized as Agency Business Drivers:

- Provide timely, consistent, and reliable information for management decisions
- Improve NASA's accountability and enable full cost management
- Achieve efficiencies and operate effectively
- Exchange information with customers and stakeholders
- Attract and retain a world-class workforce

The Operations Framework module supports the Agency Business Drivers by providing the model for a consistent method of system support and maintenance across the Agency. Specifically, this includes:

- Maintaining standard systems and operational processes
- Maintaining the computer systems that support the improved efficiency and effectiveness of business processes
- Maintaining the infrastructure and tools that allow the free flow of information within support operations. (E.g. root cause analysis and remediation plans)

Providing tools and operational environments that contribute to NASA's ability to attract and retain a highly qualified information technology (IT) The key differences identified between NASA's legacy mainframe environments and ERP environments are:

- Migration from multiple separate application environments to a single application environment

- Tight integration between modules of an ERP application and between the application and related environments
- Availability of uniquely skilled and highly specialized staff for support
- ERP application vendor requirements to provide a single Agency-wide point of contact for vendor support
- Transition of daily batch and transaction processing responsibility from IT support to the business process owners and end users

NASA centers and facilities across the United States are:

- NASA Headquarters, Washington, DC
- Ames Research Center, Mountain View, CA
- Dryden Flight Research, Center, Edwards, CA
- John H. Glenn Research Center at Lewis Field, Cleveland, OH
- Goddard Space Flight Center, Greenbelt, MD
- Independent Verification & Validation Facility, Fairmont, WV
- Jet Propulsion Laboratory, Pasadena CA
- Johnson Space Center, Houston, TX
- Kennedy Space Center, FL
- Langley Research Center, Hampton, VA
- Marshall Space Flight Center, Huntsville, AL
- Moffett Federal Airfield, Mountain View, CA
- Stennis Space Center, MS
- Wallops Flight Facility, Wallops Island, VA
- White Sands Test Facility, White Sands, NM

As NASA transitions to an ERP environment with new architectural, application and technical characteristics, the operating model is also revised to accommodate the new requirements of the ERP solution. These include:

- Focusing on core business: The Business Process Owners at each Space Center are charged with contracting and managing program support for their current systems. The responsibilities of IT support functions, such as contract administration, and managing application operations work, diverts business resources from its core business. This approach does not take advantage of the economies of scale created by using a central group to manage these tasks for the Agency as a whole.

- Managing unpredictable IT costs: The cost of implementing regulatory changes to disparate systems can become unmanageable. In addition, some of the center-based systems have limitations, which present difficulty in meeting today's business requirements.
- Responding quickly to business requirements: Business needs change and the technology solution has to be able to adapt. Applying a change to one application for the entire Agency is more responsive to the overall user community and the Agency than coordinating the center-based support groups to make changes to each disparate application.
- Supporting business innovation: While the support organization should continue the important work of responding to problems and working user requests for enhancements, it should also add value to the overall solution. Using the support group to make frequent and periodic reviews of the work being performed to identify trends in problem areas allows the support group to make recommendations to the business community. The goal is to manage the system in a manner that makes the users as productive as possible.

Best practices are being utilized to implement the most effective solutions for the NASA business community. The implemented ERP solutions will be based on an Agency-wide model and operate on a single instance in the database. These solutions will contain minimal Center-unique functionality.

2. Defense Logistic Agency

Within four years, Defense Logistics Agency (DLA) will have said goodbye to its venerated, yet antiquated, materiel management systems. Replacing programs dating back to the 1960s will be state-of-the-art software representing the best of today's business applications. DLA focused on five key areas: Organizational Redesign, Business Systems Modernization, Strategic Sourcing, Customer Knowledge/Focus and Work Force Development. This initiative relied heavily on the DLA Strategic Plan that incorporated a customer bill of rights with a vision statement to position DLA to provide the best services to America's warfighters. A team of DLA executives began the process of looking at the current organization and developing a plan for the balanced scorecard approach of DLA. The team later became known as the DLA 21 Executive Board.

When the program is completed, we will have totally changed the way we currently do business," said Mae De Vincentis, DLA Director of information operations. "Over the next five years our work force will see dramatic changes in the way we deliver technology solutions. [Ref. 3]

De Vincentis and other members of the DLA 21 Executive Board are leading the way as the agency charts a course through the early stages of Business Systems Modernization (BSM). Besides information technology replacement, BSM will also enable DLA to reengineer by fielding best practices, improve customer service by collaborating with customers and suppliers, provide best-value solutions, and provide training, experience, and opportunity for DLA employees to succeed in this new environment.

De Vincentis and Jim Bailey, Defense Supply Center Richmond deputy commander, have set their sights on IT replacement, which commands intense interest among thousands of workers who have spent their careers using programs such as the Standard Automated Materiel Management System and Defense Integrated Subsistence Management System. For her part, De Vincentis is focusing on the overall impact of this IT replacement. Bailey, meanwhile, is monitoring the effects of the replacement upon the DLA work force and customers. “For many years, we’ve designed, built and maintained our own systems, many of which have served us well for over 30 years”, De Vincentis said. “However, during the past five years we’ve come to recognize that developing software is no longer an agency core competency.”[Ref. 3] She said, DLA would be better off using software already available in the commercial sector, concentrating instead on putting those programs to best use within the agency. “Information and technology are strategic tools that give us tremendous strategic advantage, and we need to exploit them,” De Vincentis said. “That’s why we have embraced the tenet of implementing best business practices by using commercial off-the-shelf software. This is a very different approach than we’ve taken in the past as IT professionals.”[Ref. 3] Bailey emphasized that changing the agency’s IT culture to fit the model is a challenge for DLA, and “we must keep up with the modern world and can do so only by tapping the latest technology.” “Although BSM involves system and technology change -- along with process reengineering and other elements -- it also encompasses new jobs and new tools,” he said. “BSM will touch every facet of DLA business as well as every aspect of the work force and our culture. BSM, in short, is a logistics strategy for the 21st century.”[Ref. 3]

BSM employs three major commercial off-the-shelf software components that will form the major building blocks of the new system. The three software packages are SAP, Manugistics and PD2.

SAP, provides software that focuses on order fulfillment, planning and financial management. It forms the backbone, or foundation replacement system for such systems as Standard Automated Materiel Management System (SAMMS), **Defense Integrated Subsistence Management System** (DISMS) and other inventory control point systems developed over the years, providing a single, integrated system for the user. Using the backbone software provided by SAP, workers on the floor will be able to access any needed internal and external services via a “role-based interface,” [Ref. 3] that is based upon their job or needs.

Manugistics will focus on demand and supply planning activities. By providing the right information to the right people at the right time, workers will be able to collaborate more effectively with their suppliers and customers to make good supply chain decisions.

Procurement Desktop-Defense (PD2), software provides the contract-writing functions unique to the Department of Defense. De Vincentis said SAP has a broad array of software comprised of various modules, not all of which will be used by DLA.

One of BSM’s goals is to improve customer service by collaborating with customers and suppliers. Managing the customer is one key facet of the BSM strategy, which also includes information technology replacement, process reengineering, best value solutions and workforce training and skills.

Christine Gallo, DLA executive director of readiness and customer support, and Steve Bennett, Defense Supply Center Columbus deputy director, are the prime movers in BSM’s customer support arena. They are two of the DLA executives leading the change, along with hundreds of other DLA workers at a variety of activity sites, who intend to test, modify and put in place processes to benefit both customers and employees by fiscal year 2005.

This effort begins with a concept demonstration covering a select number of customers, suppliers and employees. Best practices learned from the concept demonstration will be incorporated in subsequent releases of BSM. The success of the customer-support part of BSM will rely heavily on collaboration between the agency and its customers, according to Bennett. “Collaboration is a two-way street,” he said. “Today we’re kind of in a guessing game. Our expectations could differ from customers’ expectations because there’s no mutual understanding. The result can be an unhappy customer.” “With collaboration,” Bennett said, “we and our customers can come together on these issues. We’ll have a better understanding of who is responsible for what with both sides doing things to improve support.” [Ref. 3]

Dr. Linda J. Furiga, Comptroller of the Defense Logistics Agency and Mr. George Allen, Deputy Commander, Defense Supply Center Philadelphia foresee these benefits arising from BSM:

- Automated funds control
- Ability to value inventory for pricing and external reporting
- Ability to better identify cost drivers
- Integration of financial data with logistics data
- More timely payments to vendors
- Data ownership in one system

“We are working very closely with Defense Finance & Accounting Service on the BSM project,” [Ref. 3] Furiga said. “We both know that in the future the financial jobs will be different because the processes will be different.” One of the outcomes, according to Furiga and Allen, will be a fundamental shift in the way DLA sets prices. Today, the agency has one standard sales price for most items that covers all costs. However, Allen said, not all customers require the same level of service. The result is that some DLA customers subsidize those that need premium services. “In our new model,” Allen said,

we propose to charge customers for required services over and above our standard service. For example, our sales price will include standard shipping time. If customers require an item sooner, they will pay an added charge for that service. This will give customers incentive to order in a more deliberate manner. [Ref. 3]

Customers thus will pay for costs they incur, lowering DLA's standard sales price. Meanwhile, DLA will offer incentives to customers to buy more efficiently. "During our collaboration process, using these better planning tools," Furiga said, "we will identify specific buying patterns of our customers. By analyzing their buying habits and individual requirements we may be able to help customers satisfy their requirements at lower overall cost." [Ref. 3]

A BSM best-value solution also has a strong tie to financial, and other quadrants of the Balanced Scorecard, DLA 21 Executive Board management process, that links long-range goals, strategies and outcomes to the daily activities of an organization. As Allen explained,

Best-value solutions encompass all four of the Balanced Scorecard quadrants including customer, innovation and learning, internal business and financial perspectives. The goal of BSM strategy is to let DLA adopt proven and successful business practices used in the commercial marketplace. It is imperative that financial is in balance with the other quadrants or perspectives. If you cut costs but don't have the proper balance and alignment with the other quadrants, you achieve no progress or gains. [Ref. 3]

Allen also noted that as customers' benefit, so too will DLA employees who will see the agency move to full use of enterprise resource planning.

For the first time, DLA will have the flexibility to provide tailored logistics support to our customers across all the DLA commodities. BSM will provide improved DLA support to the war fighter and quick access to global inventories and industry surge capabilities to fully integrate customer and supplier information. Our work force will have the tools they need to provide exceptional service for our customers. [Ref. 3]

E. NPS

The idea to consider an ERP came to NPS came forward when RADM David Ellison, Superintendent, was informed of NAVAIR's SIGMA ERP Solution System previously discussed in Chapter II. The Admiral wanted to explore the possibility of joining NAVAIR's ERP Solution System, currently in the Integration Testing Phase, as he believed it was an opportunity for NPS to leverage on this technology. As seen by senior management, the partnership with NAVAIR could benefit NPS, by acquiring and implementing an ERP at a fraction of the cost normally associated with this type of

purchase. An additional benefit would be reducing the time associated with implementing an ERP System, normally between 3 and 5 years, to 11 months. Management also saw the advantage of benefiting from NAVAIR lessons learned, partnering with an activity that was familiar with ERP in a Navy setting, and conducting joint training.

Some primary benefits of acquiring NAVAIR SIGMA ERP Solution System for NPS were:

- Accountability of all funded accounts
- Procuring a single database for timely reports and information
- Streamlining multiple feeder systems across the organization

1. Accountability of Funds

A major benefit of ERP is that it does not allow departments to spend funds when their account balance is \$0. This has been a continuing problem for the NPS Comptroller Department financial accounting and record keeping system. Currently managers, supervisors, and anyone having access to the feeder systems as illustrated in the diagram on Page 24, have the ability to continue to spend in accounts where balances are \$0. The only exception to this is the Electronic Time & Attendance Certification (ETAC), which is an NPS developed program. The problem with accountability of funds can also be attributed to the lack of experience or training in the personnel administering these accounts.

Managers at NPS use the Department Online Reporting Systems (DORS), a locally developed and supported system, to provide an overall balance sheet of all financial accounts. The DORS Administrator receives information from the Funds Administration and Standardized Document Automation (FASTDATA) Administrator once a day, and updates DORS with personnel time and expenses, supply expenses, contract, credit card expenses, and travel expenses against a job order number (JON). The department users access the DORS database and obtain balances on their account/JON without the necessity of accessing multiple databases. However, a major issue is the fact that any debits made after DORS has been updated are not reflected in account balances for 24 hours. This allows for overspending and inaccurate account balances.

DORS Data Flow Chart

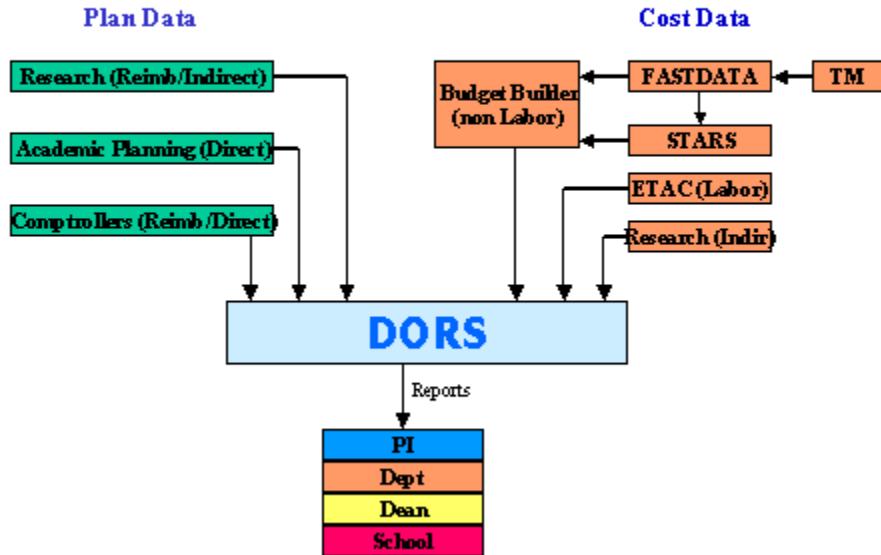


Table 3. DORS Data Flow Chart.

Expenditures at NPS are reported under two categories: Non Labor and Labor. Non Labor Expenditures are reported from STARS-FL and FASTDATA. STARS-FL is the Standard Accounting and Reporting System, an interactive real time accounting system, which provides processing and reporting of general fund accounting functions for the Navy and other Department of Defense activities. FASTDATA is the system which captures transactional information from entered documents, and reuses this data as many times as required to fulfill supply, accounting, financial management, and contractual requirements.

Feeder Systems for FASTDATA include:

- TM (Travel Manager) a web based system designed to facilitate the departments in booking their travel arrangements
- PARIS - a NPS only system used to track credit card purchases less than \$2500
- DMAS (Department Memorandum Accounting System) a program used at NPS Departments to keep track of their departmental budgets

- MIPR (Military Inter-Departmental Purchase Request) used as a Project order, Economy Act Order, Contractual Procurement or a combination of the three
- PO (Project Order) a definite and specific order issued for the production of materials or for repairs
- ANSRS (Automated Non Standard Requisitioning System) an electronic transmitting system to facilitate the award of contracts for services the credit card does not cover. This generally involves contracts above \$25K that are administered by Fleet Industrial Supply Center, San Diego, CA.

Labor expenditures at NPS are reported in ETAC, which is a computerized software program for the electronic time and attendance certification. NPS uses this system to certify attendance, leave, overtime, absences without leave, night differential, holiday work, Sunday pay, and compensatory time worked for all staff and faculty excluding public works and military.

Another dimension of financial accounts at NPS are reimbursable research dollars. These accounts are reported in the 09 Budget Page which tracks reimbursable accounts in the Research Administration Office.

2. Procuring a Single Database for Timely Reports and Information

As previously discussed, NPS has multiple feeder systems flowing to DORS. Due to the time lag of 24 hours, which prevents DORS from performing real time reporting, and the multiple layers of reporting from each feeder system, account balances often have discrepancies. An ERP would capture the data instantaneously into a single database; therefore, reports would be real time, standardized, and timely.

3. Streamlining Multiple Feeder Systems across the Organization

When all financial data is stored in one place, it eliminates irregularities and would give NPS, at any time, an accurate picture of the current, real time account balances. A major benefit of purchasing an ERP would be to integrate all the departments and functions across NPS into a single computer system that would serve all of the department particular needs.

To further investigate the possibility of purchasing this system, RADM Ellison sent a delegation of five top management officials to have a first hand look at the NAVAIR SIGMA ERP Solution System. NPS had been given \$2M, as part of the Administrative Functionality Assessment Implementation Package, and the possibility of

using these funds to purchase an ERP system was explored as a way to achieve the command's most efficient organization. At NAVAIR, NPS management officials interviewed members of the SIGMA Team. Chapter III will look at the data to determine how NPS could benefit from leveraging on the developmental work already conducted at NAVAIR.

III. DATA

A. ANNUAL COST OF RUNNING CURRENT NPS PROGRAMS

1. Indirect and Direct Costs

Indirect costs associated with running NPS school programs, include salary and equipment. The Information Technology Department has a billet requirement of 79 Computer Specialist/Clerks with pay grades ranging from GS-5 to GS-13. These individuals support all the physical computer equipment and network administration duties for Windows based and UNIX computers at NPS. Salaries plus fringe benefits are estimated at \$6.1 M. The Information Technology Department is currently under OMB Circular A-76, which is a condition that permits conversion to or from in-house contract or Inter-Service Support Agreement. The billets listed below may decrease or increase pending the outcome of the Circular A-76 study.

Pay Plan	Series	Grade	Job Title	Salary	Fringe Benefits	Total Compensation
GS	334	9	COMPUTER SPECIALIST	46,477	15,267	61,745
GS	334	9	COMPUTER SPECIALIST	46,477	15,267	61,745
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
			COMPUTER SPECIALIST			
GS	334	11	(COMPUTER SYSTEMS PR	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
			COMPUTER SPECIALIST (SYSTEM			
GS	334	11	PROGRAMMER)	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016.	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	12	(COMPUTER SYSTEMS PR	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(COMPUTER SYSTEMS PR	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(NETWORK PHYSICAL PL	67,399	22,140	89,540
			COMPUTER SPECIALIST (SYSTEM			
GS	334	12	PROGRAMMER)	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(NETWORK SERVICES)	67,399	22,140	89,540

Pay Plan	Series	Grade	Job Title	Salary	Fringe Benefits	Total Compensation
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(COMPUTER SYSTEMS PR	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(COMPUTER SYSTEMS PR	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	334	13	COMPUTER SPECIALIST	80,148	26,328	106,477
GS	334	9	COMPUTER SPECIALIST	46,477	15,267	61,745
GS	334	9	COMPUTER SPECIALIST	46,477	15,267	61,745
GS	334	9	COMPUTER SPECIALIST	46,477	15,267	61,745
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	(COMPUTER PROGRAMMER	57,888	19,016	76,904
			COMPUTER SPECIALIST			
GS	334	12	(COMPUTER SYSTEMS PR	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(COMPUTER PROGRAMMER	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(COMPUTER PROGRAMMER	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(COMPUTER SYSTEMS PR	67,399	22,140	89,540
			COMPUTER SPECIALIST			
GS	334	12	(COMPUTER SYSTEMS PR	67,399	22,140	89,540
			COMPUTER SPECIALIST (SYSTEM			
GS	334	12	PROGRAMMER)	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
			SUPERVISORY COMPUTER			
GS	334	13	SPECIALIST	80,148	26,328	106,477
			SUPERVISORY COMPUTER			
GS	334	13	SPECIALIST	80,148	26,328	106,477
GS	334	9	COMPUTER SPECIALIST	46,477	15,267	61,745
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	854	12	COMPUTER ENGINEER	67,399	22,140	89,540
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	1520	12	MATHEMATICIAN	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	303	8	ADMINISTRATIVE SUPPORT	42,082	13,823	55,906
GS	332	5	COMPUTER OPERATOR	30,675	10,076	40,752
GS	332	5	COMPUTER OPERATOR	30,675	10,076	40,752
GS	332	7	COMPUTER OPERATOR	37,998	12,482	50,480
GS	332	7	COMPUTER OPERATOR	37,998	12,482	50,480
GS	332	7	COMPUTER OPERATOR	37,998	12,482	50,480
			SUPERVISORY COMPUTER			
GS	332	9	OPERATOR	46,477	15,267	61,745

Pay Plan	Series	Grade	Job Title	Salary	Fringe Benefits	Total Compensation
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	332	7	COMPUTER OPERATOR	37,998	12,482	50,480
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	1712	12	TRAINING ADMINISTRATOR	67,399	22,140	89,540
GS	1530	12	STATISTICIAN	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	341	9	ADMINISTRATIVE OFFICER	46,477	15,267	61,745
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	399	4	STUDENT TRAINEE	27,415	9,005	36,421
GS	335	2	COMPUTER CLERK	21,666	7,117	28,783
GS	334	11	COMPUTER SPECIALIST	57,888	19,016	76,904
GS	332	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
GS	334	12	COMPUTER SPECIALIST	67,399	22,140	89,540
TOTAL				4,646,020	1,526,217	6,172,238

Table 4. Computer Support Staff Price at NPS.

In addition to the salary for Information Technology personnel, there are currently two financial systems contract operations inside the Comptroller Department for special studies and projects. These and their associated annual costs' are:

G2 Travel Manager

Estimated duration is indefinite and current contract expires July 31, of 2002.

- Working Hours: 2087 hours
- Hourly Rate: $\$ 58.41 + \text{GSA } 4\% \$ 2.44 = \$ 60.85$
- Annual Cost: $\$ 126,991.33$

Departmental Online Reporting System (DORS)

Estimated duration is indefinite and current contract expires May 31, of 2002

- Working Hours: 2087 hours
- Hourly Rate: $\$ 103.30 + \text{GSA } 4\% \$ 4.14 = 107.44$
- Annual Cost: $\$ 224,227.28$

The Information Technology Department reported spending \$46K in FY02 to replace existing servers for the programs currently in use at NPS. The office also reported replacing an average of two servers per year.

As of 1 Oct 01, the typical cost of standard server configuration without the monitor is \$1,277. The Standard Configuration Includes:

Processor	1.5GHz Intel Pentium IV
Memory	256Mbyte Non-ECC RAM
Hard Drive	40GB ATA/100 (7200 rpm)
Video Controller	32MB Performance GeForce2 AGP
DVD ROM / CDRW	16x DVD-ROM 16x MAX CDRW w/1 CD-Rewritable disk
Removable Media	Zip250Mb GX400 Zip Drive w/ 1 disk
Monitor	19" Dell M991 (18 inch viewable)
Mouse	Microsoft PS-2 InteliMouse
Keyboard	Dell Enhanced Quiet Key

Additional Standard Features:

1.44 Mbytes 3.5" Floppy Drive
Integrated 10/100 Network Interface Card
Sound Blaster 512 Voice Sound Card with
harman/kardon speakers
Dell GX400 Minitower Case
Windows 2000 Professional Operating System
Norton Anti-Virus 2001

Table 5. NPS Cost of Acquiring a Personal Computer.

As of May 1, 2002 there are 471 Faculty members and 557 staff members who have access to the NPS Network and to some if not all of the programs listed:

Budget Builder	Budget Page	DMAS	DOORS	DPAS
Modern/CSU	Travel Manager	MS Suite	MATHCAD	MATLAB
MAXIMO	SLDCADA	FORMFLOW	FOCUS	FLASH
FEDFORMS	FEDEX	FASTDATA	ETAC	ADOBE
NSERS	PARIS	PYTHON	STARS-FL	NORTON
NAVFIT	CRYSTAL BALL	HAPRIMS	POWERTRACK	SAS
REMEDY	PHOTOSHOP	SPS		

Table 6. Programs Available at NPS.

B. STANDARD COST BENEFIT ANALYSIS OF ERP FOR NPS

1. Executive Summary

a. Overview

A Gap/Fit assessment was requested by NPS to the SAP-based ERP solution being deployed within NAVAIR commencing in October 1, 2002. This Gap/Fit assessment evaluates the core business processes and technical architecture currently being implemented to support NAVAIR relative to the NPS business and technical requirements. This Gap/Fit Assessment provides NPS with a qualified estimate of time/scope/resources required to leverage the NAVAIR SIGMA Version 1.0 deployment in the NPS environment.

b. Approach

KPMG Consulting performed an on-site 4-day evaluation of key NPS business and technical requirements on February 5-8, 2002. Mr. Christophe Suchet and Mr. James Woosley conducted this review, with the help of Mr. Rickie Reynolds (Senior manager with KPMG Consulting currently leading the FA project at NPS). Mr. Suchet is a Manager with KPMG Consulting and is leading a team based in Point Mugu, which is part of the NAVAIR ERP Program deployment plan. Mr. Woosley is a Senior Consultant with KPMG Consulting and is involved with the Project Systems Team for the NAVAIR ERP Program. Mr. Suchet has been involved with the NAVAIR ERP Program from program launch in February 2000, and Mr. Woosley since May 2001. Key functional and technical NPS personnel worked with the KPMG Consulting team throughout the 4-day onsite assessment. The following areas were addressed:

- Level-set Overview: Brief Overview of NAVAIR ERP Version 1.0 Functionality
- Overview and Gap/Fit Assessment of NPS Organizational and Geographic Structure
- Overview of NPS relationship/integration with other DOD and Government agencies
- Overview and Gap/Fit Assessment of NPS Business Model, Business Processes and Reporting Requirements
- Review of key NPS Master Data and Functionalities per SAP module
- Funds / Fund centers
- General Ledger accounts, Customers, Vendors, Fixed Assets
- Projects, Cost Centers, Internal Orders
- Materials
- Employee master data (Human Resources)
- Overview and Gap/Fit Assessment of NPS Technical Infrastructure, Legacy Systems and Support Requirements
- Gap/Fit Assessment of NPS End-User Training and Change Management Impact

c. Gap/Fit Assessment – Deliverable

With the NAVAIR Version 1.0 Deployment Functional Scope as the foundation for this assessment, and using the NAVAIR SAP R/3 Technical environment based in Lexington Park, Maryland to support the system requirements for NPS, the Gap/Fit Assessment Document was the deliverable from the 4-day effort. This document provides a qualified estimate of the time/scope/resource/cost to implement the NAVAIR SIGMA Version 1.0 Deployment Functional Scope for the NPS environment.

As detailed in the document, there appears to be an 80% + fit to the SIGMA Version 1.0 functionality. This functionality fit is further discussed below.

C. GAP/FIT PROCESS

1. Scope Definition

During this 4 day effort, functional requirements of the NPS business process were evaluated relative to the NAVAIR SIGMA Version 1.0 Scope in the areas (using SAP module nomenclature) of Funds Management (FM), Finance (FI), Controlling (CO), Project Systems (PS), Materials Management (MM), Sales and Distribution (SD), Human

Resources (HR), Organizational Structures and Technical and Legacy Systems environment.

During this process, the current functional scope of the NAVAIR SIGMA Version 1.0 was discussed in detail and relevance to the desired NPS business processes examined. The findings from this process are documented below by functional area as “Applicable to NPS” vis-à-vis “Applicable to NAVAIR.” This functional comparison, in addition to the evaluation of technical infrastructure (including required data conversions and interfaces) provides the necessary information for a qualified estimate of the time/scope/resources required to implement the NAVAIR SIGMA Version 1.0 scope for NPS.

2. Project Plan

Next, a proposed implementation plan for NPS was developed to include the key project phases and time phases for both NPS and integrator resources to meet a suggested February 1, 2003 implementation date. Specifics to support the proposed project plan are in Section 3.0 of this chapter.

3. Cost Estimate Development

Finally, an estimate of project cost was developed based on the findings in Section C and D of this chapter. For the purposes of this Gap/Fit Assessment, it is assumed that NPS will leverage from the existing and planned technical infrastructure in Pax River, Maryland. Discussions have been initiated with the NAVAIR Software Process Improvement Office and Information Management Department staff to further defines these support estimates.

D. FINDINGS

1. Functionalities

The mission of the Naval Postgraduate School is to enhance U.S. security through graduate and professional education programs focusing on the unique needs of the military officer. These programs are sustained by research and advanced studies directed towards the needs of the Navy and DoD. NPS’ s goals are to increase the combat effectiveness of U.S. armed forces and its allies, and to contribute to fundamental scientific, engineering, policy, and operational advances that support the Navy, DoD, and other national security establishments.

The Naval Postgraduate School is a unique academic institution, located in Monterey, California whose emphasis is on education and research programs that are relevant to the Navy, defense and national and international security interests. NPS provides a continuum of learning opportunities, including Graduate Degree Programs, Continuous Learning Opportunities, and Refresher and Transition Education. These programs are under the auspices of the four graduate schools:

- Graduate School of Business & Public Policy
- Graduate School of Engineering & Applied Science
- School of International Graduate Studies
- Graduate School of Operational & Information Sciences

It is important to note that NPS is a General Fund activity, mostly funded with appropriations (direct funding) and reimbursable orders. Reporting is done using STARS FL. All NPS activities deal with one Defense Finance & Accounting Service Operations Locations in Charleston (Defense Civilian Payroll System is currently managed at Pensacola, but will be moved to Charleston).

2. NPS SAP Organization Structure

Based on the NPS organizational chart, we have outlined what would be the NPS organization structure in SAP. Organization structure in SAP is critical to software system design and full integration across the modules.

a. FI (Finance) Organization Structure

The external reporting requirement is the key driver to define a COMPANY CODE in SAP. NAVAIR has 7 different organizational units, which will be combined into 3 company codes. They are NAVAIR headquarters, NAWC for warfare centers and NADEP for all depots. This decision was made based on the reporting requirements and to split General Fund activities from the Working Capital Fund activities. To enable consolidated financial statements at the NAVAIR level, it will use a group company to include headquarters, depots and warfare centers.

Official financial reporting for NPS is done at the Naval Postgraduate School level.

Recommendation: One single Company Code would be created for NPS in SAP, as well as one Group Company (the Company Code is assigned to a Group Company in SAP).

b. CO (Controlling) Organizational Structure

Organizational structure within the controlling module determines how each unit is managed for internal accounting and reporting purposes. A controlling area is an organizational unit used to portray internal cost accounting transactions within a managerial perspective. A controlling area may contain one or more company codes.

In NAVAIR, only one controlling area has been created for internal cost controlling purposes.

Recommendation: The same design will apply for NPS and one controlling area will be created. This will allow NPS to handle cost allocations between different organizational units without affecting the financial accounting.

A Profit Center is a management-oriented organizational unit used for internal controlling purposes. Dividing a company into profit centers allows analysis of areas of responsibility and delegation of responsibility to decentralized units, thus treating them as “companies within the company.” It is possible to use a Profit Center to produce a full profit & loss statement, as well as a partial balance sheet statement. NAVAIR is using Profit Centers to map their 7 current organizational units (e.g. one profit center for each depot).

Recommendation: Based on our preliminary discussions, NPS may not need to create Profit Centers. NPS can have a full picture of the costs for each graduate school (and for other divisions) by using the cost center hierarchy.

Cost Center Accounting analyzes where overhead occurs within an organization. Costs are assigned to the cost centers of the organization where they originated. Cost centers are used to track expenses at the department level. A standard cost center hierarchy is created in SAP, but it is possible to create as many alternative cost center hierarchies as you want using Cost Center groups. NAVAIR is using the Cost Centers as a combination of competencies and geographic location.

Recommendation: NPS will use the Cost Centers to represent the Graduate Schools with their Departments, as well as the Divisions. The cost center structure should be close to the current NPS cost code structure.

c. FM (Funds Management) Organizational Structure

In SAP, funding and appropriations will be managed in the FM module. To create a budget structure using funds and fund centers, a Financial Management area (FM area) is created in SAP. NAVAIR is using one single FM area.

Recommendation: One FM area will be created for NPS.

In FM, the fund and funds center will store most of the Navy Line of Accounting.

Recommendation: Application of Fund

For NAVAIR, Application of Funds is used to represent appropriations, including the service indicator and beginning fiscal year. It is used to identify life and the appropriation (Treasury symbol).

Recommendation: The same design will apply for NPS.

(1) Fund. Funds in SAP represent the source of your money provided by a sponsor. In the NAVAIR solution, Funds are used to represent all the remaining fields from the Line of Accounting. Funds contain links to customer and application of funds. NAVAIR has also defined several custom defined fields to represent the NAVAIR line of accounting. They include:

- Accounting Classification Reference Number
- Subheading
- Fund Type
- Sub-allotment
- Authorization Accounting Activity
- Transaction Type
- Property Accounting Activity
- Cost Code (Project Unit, Major Cost Code, Project Unit Major Cost Code)

Recommendation: The NAVAIR design for funds will apply for NPS, since the Line of Accounting is the same.

(2) Fund Centers and Hierarchy. In the NAVAIR solution, funds centers are organizational structure elements responsible for a budget used to represent Fund and Cost Centers at the NAVAIR Headquarters level. At the field level, fund centers are used to represent organizational units (areas of responsibility, departments, and projects) and are arranged in a hierarchy. At the NAVAIR General Fund level, a fund center will represent Fund and Cost Centers and/or competencies.

Recommendation: An initial assessment for NPS is that the fund center hierarchy will map the cost center hierarchy.

(3) Commitment Items. In the NAVAIR solution, Commitment items classify the contents of budgets and plans. Commitment items classify budget transactions into revenue, expenditure, and cash balance items. Commitment items equate to object class codes. Commitment items in Funds Management are arranged in hierarchies. Commitment items will be mapped to General Ledger accounts in FI. Summarization items will be defined based on budgeting needs.

Recommendation: The same design will apply for NPS.

(4) Fund Type. In addition to the classification used in the above master data fields, NAVAIR uses one more classification to identify the type of fund. There are three different kinds of funds used at NAVAIR:

- Appropriations
- Reimbursable
- Direct Cite

Recommendation: The same design will apply for NPS.

d. Other Organizational Structure Elements

(1) Purchasing Organization. In order to use the MM (Materials Management) module, a purchasing organization is created in SAP. It is an organizational unit responsible for procuring materials or services for one or more plants and for negotiating general purchases with vendors. The purchasing organization assumes legal responsibility for all external purchase transactions .NAVAIR is one Purchasing Organization in SAP.

Recommendation: NPS will be also be one Purchasing Organization in SAP.

(2) Plant. A plant is an operational unit relevant to Logistics within a company code. In SAP, a plant is assigned to a purchasing organization and a company code.

Recommendation: NPS may have to create at least one plant in SAP.

(3) Sales Area. SAP Sales Distribution module is organized according to sales organization, distribution channel and division. A combination of these three organizational units forms the sales area. The SD module will be used to manage billing for reimbursable work.

The sales organization is an organizational unit within logistics that structures the company according to its sales requirements.

Recommendation: NPS will be one Sales Organization in SAP.

(4) Personnel Area. The use of the HR (Human Resources) module requires defining the personnel area. The personnel area is an organizational unit set-up according to a personnel administration, time management and payroll organizational point of view.

Recommendation: NPS will create one Personnel Area in the HR module.

3. Proposed NPS SAP Organization Structure

The chart below represents a high level design of the SAP organizational structure for NPS. This design will be further refined and validated during the Blueprint Phase. One of the critical success factors for the NPS ERP project is the reusability of the NAVAIR FM (Funds Management) design, which accommodates the NAVY Line of Accounting.

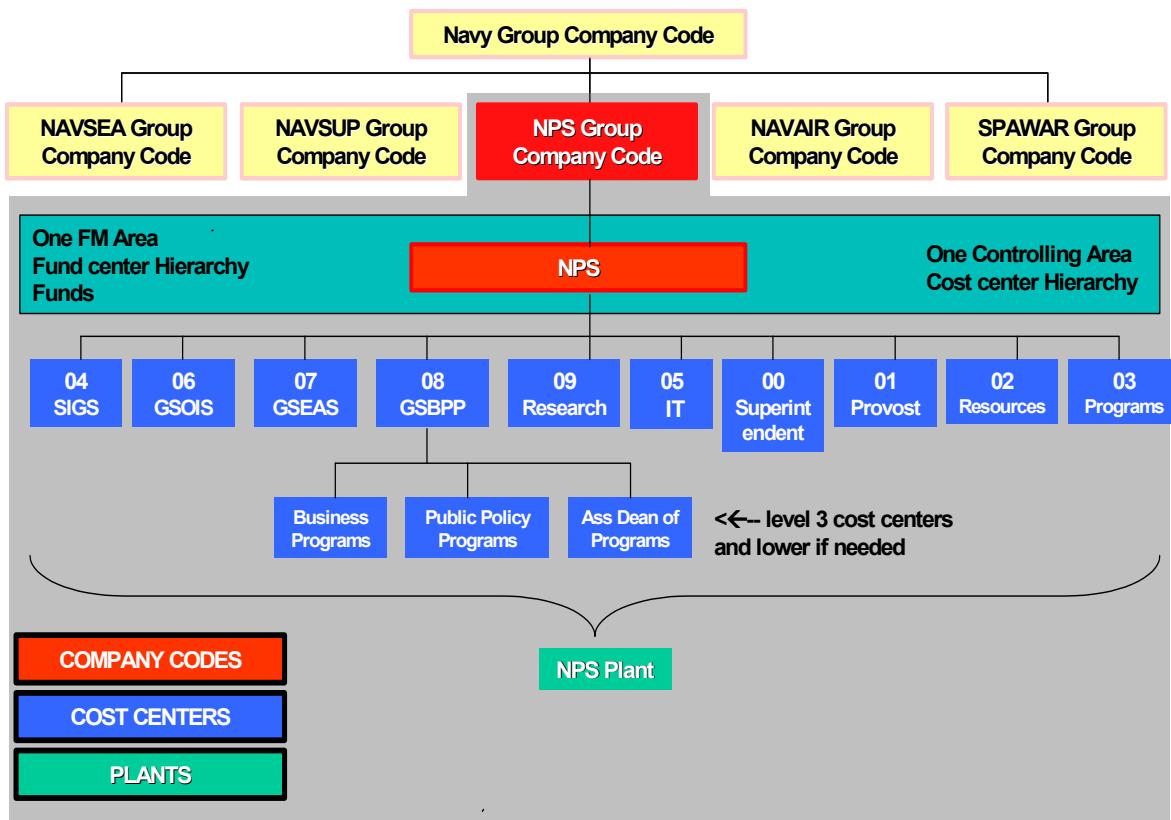


Table 7. NPS SAP Organization Structure.

4. Functionalities Per Module

During the 4-day Gap/Fit analysis, processes and functionalities applicable for NAVAIR's ERP project were reviewed at a high level and compared to NPS's business requirements. Applicability to NPS processes is represented in the Functional Matrix below. This representation is per SAP module, assuming that the scope applicable to NPS would include the following modules:

- FI: Financial Accounting
- FM: Funds Management
- CO: Controlling
- PS: Project Systems
- MM: Materials Management
- SD: Sales Distribution
- HR: Human Resources

Gaps or issues identified will be specified at the end of this section.

5. Detailed Functional Scope FI - FINANCIAL ACCOUNTING

	FUNCTIONAL VIEW MATRIX	Applicable to NPS	Applicable to NAVAIR	Remarks
FINANCIAL ACCOUNTING				
<i>General Ledger</i>				
Organization Structure	X	X		Organization structure to be determined for financial accounting and reporting purposes (see above 2.1.1). NPS likely would be one single company code in SAP, one Controlling area and one Financial Management area.
Operating Chart of Accounts	X	X		NAVAIR is using USSGL as operating chart of accounts. NPS will also switch to use USSGL.
Postings in General Ledger	X	X		Used to enter Journal Vouchers. Currently managed at DFAS.
Recurring Entries	X	X		
Reversing Entries	X	X		
Open Item Management and Clearing	X	X		
Closing Operations	X	X		NPS and DFAS are processing closing operations. DFAS is doing the official closing.
Foreign Currency Accounting				NPS processes some transactions in a foreign currency, but they are booked in USD. All financial statements are produced in USD.
Inter-Company Accounting		X		Not applicable to NPS, since it will be one company code in SAP.
Financial Statement Versions	X	X		Financial Statement versions define the grouping of accounts for balance sheet and income statements. NPS will specify the versions of financial statements, which should closely match to NAVAIR's.
<i>Accounts Receivable</i>				
Customer Master Records	X	X		NPS billing requirements should be the same as NAVAIR Headquarters. DFAS is billing the customers (FRS and OPAC)
Customer Invoice	X	X		
Incoming Payment Processing	X	X		Transaction used to process the payment file received from CERPS (DFAS activity)
Open Item Management and Clearing	X	X		
Dunning		X		Dunning done by DFAS. Probably will not use SAP.
<i>Accounts Payable and Invoice Verification</i>				
Vendors Master Record	X	X		
Vendor Invoice	X	X		
Vendor Payments	X	X		Transaction used to process the payment file received from CERPS (DFAS activity)
Open Item Management and Clearing	X	X		
<i>Asset Accounting</i>				
Fixed Asset Master Record	X	X		DPAS is the required system for NPS's Fixed Asset Accounting. During the design phase, we will decide if we can implement Asset Accounting and not use DPAS. If DPAS is to be maintained, manual journal entries will be entered in SAP FI at month-end could be sufficient.
Acquisition Process	X	X		
Retirement / Disposal Process	X	X		
Depreciation	X	X		
Reporting	X	X		

Table 8. Finance Matrix.

Note that some financial operations (e.g. closing operations) will require discussion/ confirmation with DFAS. It is highly recommended to involve DFAS Charleston very early in the project. This communication with DFAS will assure business requirements are correct, and contribute to a successful SAP implementation.

6. Detailed Functional Scope CO – CONTROLLING

FUNCTIONAL VIEW MATRIX		Applicable to NPS	Applicable to NAVAIR	Remarks
CONTROLLING				
<i>Overhead Cost Controlling</i>				
	Organization Structures	X	X	At NAVAIR one controlling area will be created to manage controlling functions within NAVAIR. One controlling area would be also created for NPS.
	Cost Element Accounting	X	X	Cost Element accounting will be used by the NPS solution to integrate financial accounting to cost accounting.
	Reconciliation Ledger	X	X	Reconciliation ledger will be used by NPS solution to track the internal allocations occurring within cost accounting that might affect the financial accounting.
	Activity Types	X	X	NPS solution will use activity types to allocate labor. Each activity type is linked to the actual salary of the individual and it is accelerated to define different categories of labor and define the rates for each type.
	Statistical Key Figures	X	X	NPS could use statistical key figures for cost allocations that are not based on labor. NPS will probably use statistical key figures.
	Cost Centers	X	X	Most of the costs for NPS are currently collected at the cost center level.
	Cost Center Planning	X	X	Planning will be used by NPS for cost centers.
	Periodic Allocations	X	X	This maybe a solution for indirect costs distribution at NPS.
	Overhead Calculation	X	X	This function is used to apply surcharges, overheads... The use of these transactions for NPS will be investigated during the blueprint phase.
	Internal Orders	X	X	Internal orders will be used by NPS to track costs at a lower level than cost centers. Projects costs will probably be tracked using the PS module.
	Profit Center Accounting	X	X	NPS design will probably not use profit center accounting, since the cost center hierarchy should be enough to meet the requirements

Table 9. Controlling Matrix.

7. Detailed Functional Scope FM – FUNDS MANAGEMENT

	FUNCTIONAL VIEW MATRIX	Applicable to NPS	Applicable to NAVAIR	Remarks
FUNDS MANAGEMENT				
<i>Master Data</i>				
Application of Funds (Appropriation)	X	X		Will contain the Appropriation Symbol
Fund Centers	X	X		Fund centers will be defined for NPS. It is usually close to the Cost center structure
Fund Centers Hierarchy	X	X		Organizational Hierarchy of units responsible for funds will be setup for NPS
Commitment Items and Summarization Items (Object Class Code)	X	X		Object Class Codes are used by NPS
Funds (Most LOA items)	X	X		Most Line Of Accounting fields, not including the appropriation, RFM and Object Class Code will be represented in the Fund Master Data. NAVAIR design will be applicable for NPS
<i>Business Processes</i>				
Budget Formulation	X	X		
Budget Preparation (Exhibits, Versions)	X	X		Budget Exhibits, What-if scenarios during budget preparation. Most of the budget exhibits produced by NPS are addressed in the NAVAIR ERP project
Budget Allocation	X	X		Budget Allocation Processes
Budget Execution	X	X		Funding documents, invoices and payments
Budget Availability Control	X	X		Checking for funds availability during execution is performed in FM
Status Management (Management of Funds expiration and cancellation)	X	X		
Budget Updates (Supplements, Transfers, Rescissions)	X	X		
Integration with Cost Accounting and FM Deriver	X	X		Deriving the fund / funds center from the cost objects will be used by NPS.
Release Budget (Budget Execution)	X	X		
Direct Cite	X	X		NPS will use the same solution for Direct Cite as defined for NAVAIR. When NPS gets a Direct Cite, the money is not obligated. NPS does not track the money for Direct Cite.

Table 10. Funds Management Matrix.

Line of Accounting (LOA) used at NAVY is 48-character long and contains information such as the appropriation, program, and the project on which the funds are being expended. This section compares the existing LOA structure at NPS with the proposed structure in NAVAIR solution.

NPS LOA Fields		NAVAIR Solution
ACRN		Fund Master
Appropriation	Service Indicator	Application of Fund
	Beginning Fiscal Year	
	Appropriation Symbol	
Subhead		Fund Master
Object Class Code		1. Commitment Item 2. General Ledger Account 3. Cost Element
Bureau Control Number	PARM	Fund
	RFM	Fund Center Cost Center
Sub-Allotment		Fund Master Custom-defined field
Authorized Accounting Activity		Fund Master Custom-defined field
Property Accounting Activity		Fund Master Custom-defined field
Transaction Type		Fund Master Custom-defined field
Cost Code	Project Unit	Fund Master Custom-defined field
	Major Cost Code	Fund Master Custom-defined field
	PDLI + Suffix	Fund Master Custom-defined field

Table 11. Line of Accounting.

More analysis is needed during the Blueprint Phase, but it appears that the SAP solution to accommodate the NPS LOA will be the same as that for NAVAIR.

8. Detailed Functional Scope PS – PROJECT SYSTEMS

In discussions with NPS personnel, it was determined that NPS will not be managing projects to the same level of detail as NAVAIR. Using a variety of WBS levels should be adequate for NPS and not require the use of Networks and Activities. Activity Based Costing (ABC) and Earned Value Management (EVM) would not be implemented in Phase One.

	Functional View Matrix	Applicable to NPS	Applicable to NAVAIR	Remarks
PROJECT SYSTEMS				
<i>Templates</i>				
Milestone Templates	X	X		NPS does not use extensive milestones within a project
WBS Templates for Planning and Execution	X	X		Templates are not used for planning and execution, but some may be applicable to certain types of projects.
Project Task and Activity Templates		X		Activity Based Costing is not currently being used at NPS to the level that it would be included in SAP.
<i>Operative Objects</i>				
Work Centers	X	X		Logical grouping of labor resources for tasks. Cost centers should be enough for NPS.
WBS for Planning and Execution	X	X		Work breakdown Structures (WBS) will be used at NPS for research projects, studies...
Project Tasks and Activities	X	X		Equivalent to work packages or Job Order Numbers. It is probably a lower level to what NPS wants to go. WBS should be enough to map the Job Order Numbers.
<i>Project Planning</i>				
Customer Quotation Processing				NPS costs out reimbursable work for a customer. Customer quotation functionality in SAP is not needed.
Simulation Functions	X	X		What-if analysis
Revenue Planning				
WBS Cost Planning	X	X		
Task Level Planning	X	X		This level of planning is probably not needed for NPS. To be determined during the Blueprint Phase.
WBS Date Planning	X	X		To be determined during the Blueprint Phase
Workforce Assignment and Planning	X	X		Requires HR integration. There is a need to report hours collected on a project per person.
Work Center Capacity Planning		X		Assignment of capacities to work centers; capacity utilization and evaluation.
Material Requirements Planning				Not in scope for NAVAIR's ERP Pilot. Not used by NPS
Planned Overhead Processing	X	X		Periodic overhead processing. NPS distributes overheads.
<i>Project Budgeting</i>				
Budget Allocation	X	X		
Budget Releases	X	X		Independent of appropriation type.
Budget Updates	X	X		
<i>Project Execution</i>				
Status Management	X	X		System statuses for a project in SAP should be enough to meet NPS requirements.
Confirm Completions in Tasks and Activities		X		This level of detail is not needed for NPS
Time Sheet Processing	X	X		Interface with SLDCADA
Sales Order Processing	X	X		For Navy and non-Navy customers.
Billing and Invoicing Processing	X	X		For Navy and non-Navy customers.
Earned Value Calculation		X		Not needed initially
<i>Period-End Processing</i>				
Actual Overhead Processing.	X	X		Periodic overhead processing. We will determine during the blueprint phase if this functionality is needed.
Project Results and WIP Calculation		X		
Settle Projects		X		No CPP project. It seems that settlement functionality is not needed for NPS
<i>Project Monitoring and Controlling</i>				
Active Spending Control	X	X		
Project Progress Analysis	X	X		To be further investigated for NPS.
Document Management	X	X		To be further investigated for NPS.
<i>Reporting</i>				
Progress Reporting	X	X		One of many reporting requirements.
Project Plans, Budgets, Expenditures	X	X		One of many reporting requirements.
Budget Exhibits	X	X		Generated during the POM process.

Table 12. Project Management and Tracking Matrix.

Three major project types were outlined:

- Research Projects – These are the academic research projects led by professors. Primarily funded by reimbursable Military Interdepartmental Purchase Request (MIPR). There are about 900 of these projects each year. There is currently no template used, and they will probably remain free form with SAP. Very large or similarly structured projects requiring strict planning may be discovered in the Blueprint Phase and lead to the development of some templates. Overall, these project structures would primarily be used to track and manage costs. Detailed planning would only be used in a minority of projects.
- Internal Projects – These are a variety of projects conducted by NPS to manage its work. This would include business reengineering contracts and the like. Primarily funded by OM&N. A basic template could be created for these projects.
- Facilities Projects – These are the day-to-day tasks that the Public Works Center department conducts. One possible project structure would be to have a project for each building, with a WBS structure based on rooms and/or standard maintenance activities. Primarily MIPR funded.

Note that specific reporting requirements at Naval Facilities Engineering Command for the Public Work Center department will have to be studied during the design phase. NPS owns their facilities and needs to track the costs at a very low level to meet the PWC's requirements.

It is important to note that most of the purchasing transactions for NPS are done using the purchase card process NAVAIR's ERP design includes interfaces between SAP and systems like STARS ONE PAY, DAASC / CITIBANK. SPS will also remain at least for Phase 1.

9. Detailed Functional Scope MM – MATERIALS MANAGEMENT

	Functional View Matrix	Applicable to NPS	Applicable to NAVAIR	Remarks
	MATERIALS MANAGEMENT			
	Info Records	X	X	Info records are created automatically when purchase Orders are created.
	Confirmation Control / Shipping Notification		X	NPS does order a few things using MILSTRIP (1348). Manual process with message. NPS will keep the manual process with MISLTRIP = 50 transactions a year
	Vendor Evaluation		X	NPS will not use this functionality in the first phase.
	Pricing Conditions			Not Applicable
	Quota Arrangements			Not done by NPS
	Import and Export		X	NPS does ship some government materials overseas. Manual process.
	Taxes			Not Applicable
	Subcontracting		X	Business needs exist to track subcontracting. This functionality is available with another system for NPS. Not in scope for NAVAIR.
	External Services Management	X	X	NPS maybe desire this functionality for Phase 2.
	Logistics General			
	Material Master Data	X	X	Material master data is setup to track Federal supply materials, non-stock materials, maintenance assemblies, and manufacturer part numbers...
	Vendor Master Data (purchasing data)	X	X	Vendor master data is shared by the Finance module (Accounts Payable) and MM. NAVAIR SAP system will be interfaced with CCR for commercial vendors. This likely will apply for NPS.
	Classification	X	X	May be necessary for some material masters. Needs more investigation for NPS.
	Engineering Change Management		X	Not needed for NPS. At NAVAIR, it is planned for tracking ECPs Configuration Mgmt. Asset Tracking (PM) – Integration with Plant Maintenance (BOMs, Routings, Equipment and Materials).
	Inventory Management			
	Goods Receipt	X	X	
	Stock Transfers		X	All materials are directly expensed. No inventory values reported.
	Inter-Company Stock Transfers			NPS would be one company code in SAP. No inter-company transfers.
	Goods Issues		X	Goods are issued, but it is already expensed.
	Reservations			Not applicable
	Consignment			Not applicable
	Physical Inventory			It is probably done in DPAS for NPS
	Logistics Invoice Verification			
	Invoice Verification	X	X	

Table 13. Materials Management Matrix.

10. Detailed Functional Scope SD – SALES DISTRIBUTION

Functional View Matrix	Applicable to NPS	Applicable to NAVAIR	Remarks
SALES DISTRIBUTION			
<i>Master Data</i>			
Customer	X	X	NPS customers are mostly other government, NAVY, NASA, ...
Customer Hierarchy			
Material	X	X	
Sales BOMS			
<i>Credit Processing</i>			
<i>Pricing</i>			
Conditions	X	X	
Agreements			
<i>Sales</i>			
Inquiry			
Quotation			
Contracts			
Scheduling Agreement			
Sales Orders	X	X	
Complaints			
<i>Shipping</i>			
Delivery Processing			
Transportation			
Packing			
<i>Foreign Trade</i>			
<i>Billing</i>			
Billing Documents	X	X	DFAS runs billing for NPS billing once a month. There is no WIP (Work – in – process) calculation (to be verified with DFAS).
Invoice Lists	X	X	
Rebate Processing			
<i>Sales Support</i>			
Contacts			
Sales Activities			
<i>Sales Information Systems</i>	X	X	
<i>Commissions</i>			

Table 14. Sales Distribution Matrix.

The Sales Distribution module will be implemented for NPS to handle billing functions. NPS deals with a significant dollar level of reimbursable work. When a funding document is received by NPS, a sales order will be created in SD (as well as a fund in FM and a budget structure in PS). NPS requirements match those of NAVAIR Headquarters.

11. Detailed Functional Scope HR – HUMAN RESOURCES

The HR module will be configured to create NPS employee master data. Employee master data is used in the labor allocation process when CATS (cross application timesheet) is running.

HR module (Human Resources) will be used by NPS to track labor costs at the employee level during the cost allocation process. This functionality exists in the NAVAIR solution.

Note that the NAVAIR solution includes other functionalities in HR: Personnel Development, Training & Events Management. Although NPS is interested in these functionalities, it will not be included in the scope of this ERP project for phase 1. Business Process Reengineering activities are needed first to establish procedures regarding Individual Development Plans, Performance Appraisals and Training.

Recommendation: NAVAIR's design for HR should be applicable to NPS.

	Functional View Matrix	Applicable to NAVAIR	Applicable to NPS	Remarks
HUMAN RESOURCES				
<i>Organizational Management</i>				Employee position, organizational assignment, reporting structure (reports to / is supervised by), team assignment.
Organizational Plan Management	X	X		
Integration with Personnel Administration	X	X		
Maintain Organizational Units	X	X		NPS will map their HR organizational chart to Org Units (12 character) in SAP.
Maintain Jobs	X	X		May not be included in phase 1 for NPS
Maintain Positions	X	X		May not be included in phase 1 for NPS
Task Catalog				Used for Activity Based Costing (ABC) processes. Not in scope
Work Center				Not yet identified as NAVAIR requirement. Workcenters defined with Logistics (PM/PS) are currently not integrated with HR. Not in scope for NPS.
Maintain Cost Center Assignment	X	X		Important for CO / HR integration
Graphical Structure Maintenance	X	X		
Job Description (I1002)	X	X		May not be included in phase 1 for NPS
Position Description (I1002)	X	X		May not be included in phase 1 for NPS
Task Description (I1002)				Used for Activity Based Costing (ABC) processes. Not in scope
<i>Master Data (Personnel Administration)</i>				Employee personal data, organizational/team assignments, work schedules, basic pay, additional pay (recurring/non-recurring)
Personal Data	X	X		Will be used to create HR master data for NPS

	Functional View Matrix	Applicable to NAVAIR	Applicable to NPS	Remarks
Addresses		X	X	
Bank Details				Not in scope
Family/Related Persons				Not in scope
Education and Training		X		Will not be used in phase 1 for NPS.
Other/Previous Employers				Not in scope
Qualifications		X		Integrated with Personnel Development module. Coordinate definition of master data with Workforce Composition and Sizing/Career Development Office. Will not be used in phase 1 for NPS.
Appraisals		X		Integrated with Personnel Development module. Will not be used in phase 1 for NPS.
Membership Fees				Maintained in DCPS payroll.
Communications Data		X	X	
Additional Personal Data US		X	X	Enhancement to SAP standard Infotype performed.
<i>Organizational Data (PA)</i>				
Organizational Assignment		X	X	Needs to be implemented to use CATS
Planned Working Time		X	X	
Basic Pay		X	X	
Recurring Pay		X	X	Needed to capture locality, retention, severance pay.
Additional Pay		X	X	Service awards - interface from DCPS.
Awards		X		Workflow approval process required to route performance award request. Will not be used in phase 1 for NPS.
Contract Elements				Not in scope
Internal Medical Service				Not in scope
Monitoring of Dates		X	X	Needs to be implemented to use CATS
Powers of Attorney				Not in scope
Date Specifications		X	X	Date types being defined based on DCPDS / DCPS requirements.
Internal Data		X	X	Used for Building number and Room number
Benefits				Benefits information to remain in DCPDS / DCPS.
Grievances, U.S				Not in scope
Residence Status U.S		X	X	
Workers Compensation		X		Not in scope
<i>Personnel Administration</i>				
Personnel Actions (Defined by DCPDS Nature of Action Codes)		X	X	Personal and organizational information, hire/re-hire/transfer/promotion/increase in pay grade actions, status - active/inactive
Historical Information		X		Custom SAP Infotype created to capture DCPDS, NOAC and Legal Authority
Reporting		X	X	Provide employee history via Business Information Warehouse (BW). Not in scope for NPS phase 1 (BW not in scope)
<i>Time Management</i>				
Factory Calendar/Public Holiday Calendar		X	X	
Work Schedules		X	X	
Absences		X	X	
Attendances		X	X	
Quotas		X	X	
Substitutions				Not in scope
Overtime				Not in scope

	Functional View Matrix	Applicable to NAVAIR	Applicable to NPS	Remarks
	Compensatory Time			Not in scope
	Time Recording	X	X	Performed via CATS
	Plant Data Collections			Not in scope
	Time Tickets			Not in scope
<i>Time Evaluation</i>				
	Day Evaluation			Not in scope
	Absence Entitlement Accrual			Not in scope
	Leave Donor Program			Not in scope
	Time Statement			Not in scope
	Attendance List			Not in scope
	Time Management Info System			Not in scope
	Transfer External -> Time Management			Not in scope
	Post Processing of PDC Error Records			Not in scope
	Activity Allocation	X	X	Performed via CATS with transfer to CO.
<i>Cross Application Time Sheet (CATS)</i>				
	Display Time Data	X	X	
	Maintain Time Data	X	X	
	Fast Entry of Time Data	X	X	
	Supply Personnel Data	X	X	
	Supply Master Data	X	X	
	Post Person Time Events	X	X	
	Post Working Time Events	X	X	
	Absence List	X	X	
	Graphical Attendance/Abs. Overview	X	X	
	Display Incentive Wages Data			Not in scope
	Process Batch Input Session			Not in scope
	Time Leveling			Not in scope
	Employment Percentage			Not in scope
	Reassignment of Pay Scale Group			Not in scope
	Recalculate Indiv. Incentive Wages			Not in scope
	Recalculate Group Incentive Wages			Not in scope
	Incentive Wages: Current Settings			Not in scope
	Approve Times: Master Data	X	X	Incorporating Time approval workflow with customization of standard SAP workflow template. May not be included in phase 1 for NPS
<i>Personnel Development</i>				
	Qualifications Catalog	X		
	Maintain Proficiency Scales	X		
	Career & Succession Planning	X		
	Career Models	X		
	Career & Individual Development Plans	X		
	Personnel Performance Appraisals	X		
<i>Training & Events Management</i>				
	Business Event Planning	X		
	Business Event Catalog	X		
	Maintain Organizer	X		
	Price Proposal	X		

	Functional View Matrix	Applicable to NAVAIR	Applicable to NPS	Remarks
	Cost/Price Determination	X		
	Time Schedule	X		
	Business Event Group/Type	X		
	Dynamic Business Event Menu	X		
	Business Event Resource Administration	X		
	Dynamic Resource Menu	X		
	Business Event Location	X		
	Material Procurement	X		
	Business Event Advertising	X		
	Business Event Performance	X		
	Dynamic Business Event Menu	X		
	Prebook	X		
	Book	X		
	Firmly Book/Cancel	X		
	Business Event Follow-up Processing	X		
	Follow up	X		
	Appraisal	X		
	Dynamic Attendee Menu	X		
	Settlement and Allocation of Business Event Fees	X		
	Billing	X		
	Allocation and Reposting of Business Event Costs	X		
	Cost Transfer	X		
	Manager's Desktop			
	Employee Self-Service	X	X	ESS activated for time management (CATS)
	Employee Locator	X		
	Training & Events Management	X		
	Time Management	X	X	
	Skills Profile	X		
	Travel Management & Planning			
	Personnel Cost Planning			
	Benefits Administration			
	Payroll			Maintained in DCPS – waiver required to use SAP. Not in scope
	Recruitment			
	Shift Planning			
	Compensation Management			Not in scope
	Maintain Performance Rating			
	Compensation Planning/Budgeting			
	Maintain Guidelines			
	Compensation Actions/Monitoring			
	Pay Scale Increase			
	Pay Scale Reclassification			
	Interface to Payroll			
	Job Pricing			
	Personnel Cost Planning			
	HR Reporting			
	Reporting - SAP Standard Reports	X	X	

	Functional View Matrix	Applicable to NAVAIR	Applicable to NPS	Remarks
	Reporting - Adhoc Query	X	X	
	Reporting - ABAP Query	X	X	
	Business Information Warehouse	X		

Table 15. Functional Matrix (Human Resources).

NPS counts about 1064 Civilian, 84 Enlisted Billets and 79 Officers. Some people work at NPS (e.g. MWR), but they are not on NPS payroll. The Human Resources Department (HRO) is using an application from Bureau of Naval Personnel to track these people. This AS-IS process will remain the same with SAP.

HRO also uses Customer Service Unit from Modern Defense Civilian Personnel Data System to run various reports; this process will not change.

NPS employees will also keep using EBIS (Employee Benefit Information System), as a self-service connection application.

HR Personnel Administration and part of Time Management are required in HR to use CATS (Cross Application Time Sheet). The scope for NPS will be limited to those functionalities in phase 1. Depending on the findings during the blueprint phase of the project, it may or may not be appropriate to implement additional functionalities in Organizational Management.

The other HR sub modules necessary to support Personnel Development Plan, Training and Appraisal are not in the scope for NPS phase 1.

E. GAP ANALYSIS FOR IMPLEMENTING ERP

1. Gaps/Issues identified

Few gaps/issues have been identified in comparing NAVAIR functionalities to NPS business requirements. The following list is more about areas that need further investigation to define a solution for NPS:

- Defense Property Accountability System (DPAS) for Fixed Asset Accounting:

NPS is using the required system DPAS for fixed asset accounting. NAVAIR is not currently using DPAS, but may have to implement this system later.

Two options are available for NPS:

- Replacing DPAS with SAP functionalities (Asset Accounting module)
- Entering manual Journal Entries in SAP FI and keeping DPAS as the Fixed Asset Accounting system.

Recommendation: NPS should select option 2 for the short term, if it is not possible to receive a waiver from DFAS. A SAP / DPAS interface is not in scope.

- PARIS (system used for Purchase Card process at NPS):

NPS is the only shore installation that uses PARIS. Other shore installations use Citibank.

Recommendation: KPMG 's recommends replacing PARIS by the NAVAIR purchase card solution, using a DAASC/Citibank interface (which is in scope). If this solution does not meet NPS business requirements, scope will have to be extended to include an interface PARIS/SAP.

From a functional standpoint, the NAVAIR SAP Purchase card solution with Citibank allows the following:

- Multiple lines of accounting for a given purchase request.
- Credit card holders can reconcile their statements on a daily basis
- SAP reports can be run by buyer and approving officer.
- The purchase card process starts in SAP with the creation of a purchase order, which obligates funds.

Recommendation: replace PARIS and use the NAVAIR purchase card solution. An interface would be created and is in scope.

- Automated Non Standard Requisitioning System (ANSRS) and Standard Purchasing System (SPS), systems used at NPS for purchases > \$ 2500:

ANSRS is used to enter the purchase requisitions and will be replaced by the SAP MM (Materials Management) module using purchase requisitions. Those purchase requisitions will have to be sent manually to the SPS system (FISC people). Once the contract will be awarded in SPS, a purchase order will be created manually in SAP, which will obligate the funds.

Recommendation: replace ANSRS by SAP and setup a manual process between SAP and SPS. There is no interface between SAP and SPS.

- POWERTRACK (Navy system to track shipping): POWERTRACK is currently interfaced to STARS FL. Very few transactions are entered in POWERTRACK for NPS. Our recommendation is to process those transactions manually in SAP.

Recommendation: enter POWERTRACK transactions manually in SAP. There is no interface between SAP and POWERTRACK.

- PYTHON: PYTHON is a student management system used at NPS. It is a stand-alone system.

Recommendation: keep PYTHON. No interface with SAP.

- Use of Internal Orders or WBS elements to track project costs: The use of internal orders may be sufficient to track costs for some NPS projects. The NAVAIR ERP design uses WBS elements and Network /Activities. Further analysis is required during the Blueprint Phase. Based on NPS' s strategic direction, it seems appropriate to use the Project System module and define a WBS structure for NPS projects.
- Other functionalities: During the design phase, the project team will have to organize workshops to discuss the following items:
 - Labor project plan
 - Indirect costs distribution
 - Awards / grants
 - Accounting for research projects
- Naval Facilities Engineering Command requirements: NPS is using a stand-alone system – MAXIMO, an application program used for the management of work orders and supplies in the Public Works Department.
- Budget exhibits:

The list of budget exhibits produced by NPS has to be compared to the budget exhibits developed for the NAVAIR ERP solution. No major differences are seen. NPS is using the systems Crystal Reports and BUDGET BUILDER to produce the exhibits.

- Legacy systems:

Based on the initial assessment, most of the interfaces to be required by NPS are already covered in the NAVAIR' s ERP project. Further investigation during the Blueprint Phase will determine the future of NPS legacy systems (e.g. Fastdata, Paris, ANSRS, DORS, E-TAC, Powertrack, MAXIMO).

F. SUMMARY

Based on discussions during the 4-day Gap/Fit process, there is a strong alignment between NPS's needs and NAVAIR's SAP functionalities. Approximately 80% + of NPS's business requirements are already designed in the NAVAIR system. This conclusion regarding the Gap/Fit between NPS business requirements and the NAVAIR system is critical to ensure a smooth and successful SAP implementation at NPS. Leveraging the NAVAIR design will allow NPS to focus appropriate resources on the 20% gap (often the most critical part of a package implementation), rather the expenditure required when defining a solution from scratch.

NPS's SAP project will fine-tune the TO-BE processes defined by NAVAIR to align to NPS's business requirements.

Finally, there is a strong alignment between NPS and NAVAIR from a legacy system standpoint. Most of the interfaces / data conversion requirements for NPS are currently developed or being developed by the NAVAIR project (refer to 2.2.). This is also a critical success factor for NPS.

1. Systems and Technical Infrastructure

The systems and technical infrastructure requirements of NPS were evaluated relative to the following criteria: NAVAIR planned technical support infrastructure (*including NMCI*)

- Planned SIGMA Version 1.0 Interfaces and Conversions
- Planned SIGMA Version 1.0 SAP-certified “bolt-on” products

2. Technical Support Infrastructure

The diagram below depicts the planned infrastructure to support the NAVAIR SAP R/3 environment:

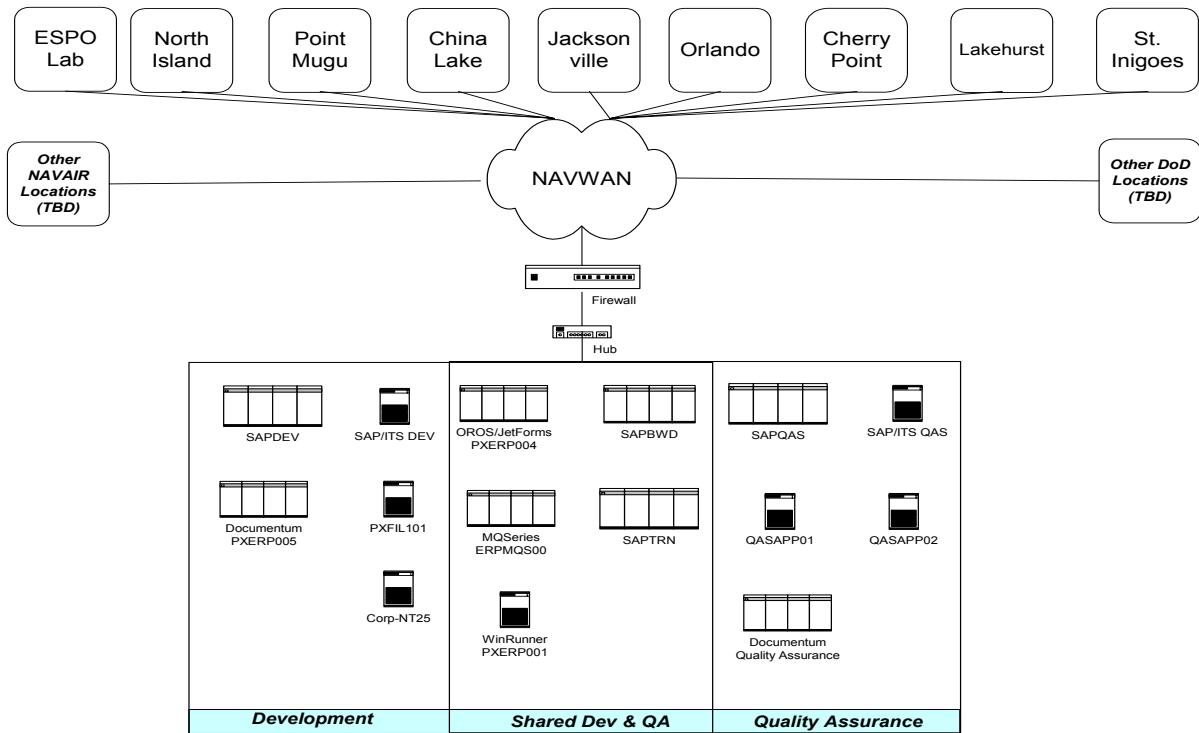


Table 16. IMD - Pax River.

In this environment, database and application servers for the Development, QA (Quality Assurance), Training and Production environments will be based and supported out of Information Management Depot in Pax River, Maryland. SAP users will log-on via the SAP Graphical User Interface (GUI) (thin client) on their PC and communicate with these servers via Local Area and Wide Area networks. All NAVAIR users log-on to a single SAP database (“instance”) and thus are operating from the same set of configuration rules and business processes across the organization. In this environment, “Basis” personnel located at Information Management Department, perform typical system administration support for the entire user base and are currently staffed to accommodate East and West Coast business hours.

Assuming that NPS will leverage from this environment, connectivity to the Navy Wide Area Network (NAWWAN) will be key to ensure a proper SAP environment for NPS.

The level of integration with the NAVAIR ERP program can be described as follows.

NPS exists as an additional Company Code within the existing NAVAIR SAP instance. As a result, NPS will be governed by many of the same configuration and business rules as NAVAIR, however it will leverage from shared configuration management, Disaster Recovery Planning (DRP), interface and system upgrades across the enterprise.

NAVAIR SAP reliability is supposed to be 99.9%. As far as the disaster recovery site is concerned, it will be located in China Lake and will be up 60 seconds after the problem occurs.

Note that NAVAIR Software Process Improvement Office/Information Management Depot with respect to providing support for the NPS ERP program has agreed in concept to support this environment and is currently in the process of providing cost estimates for the Application Service Provider model.

3. Interfaces and Conversions

The diagrams below depicts the planned Interfaces and Conversions for SIGMA Version 1.0:

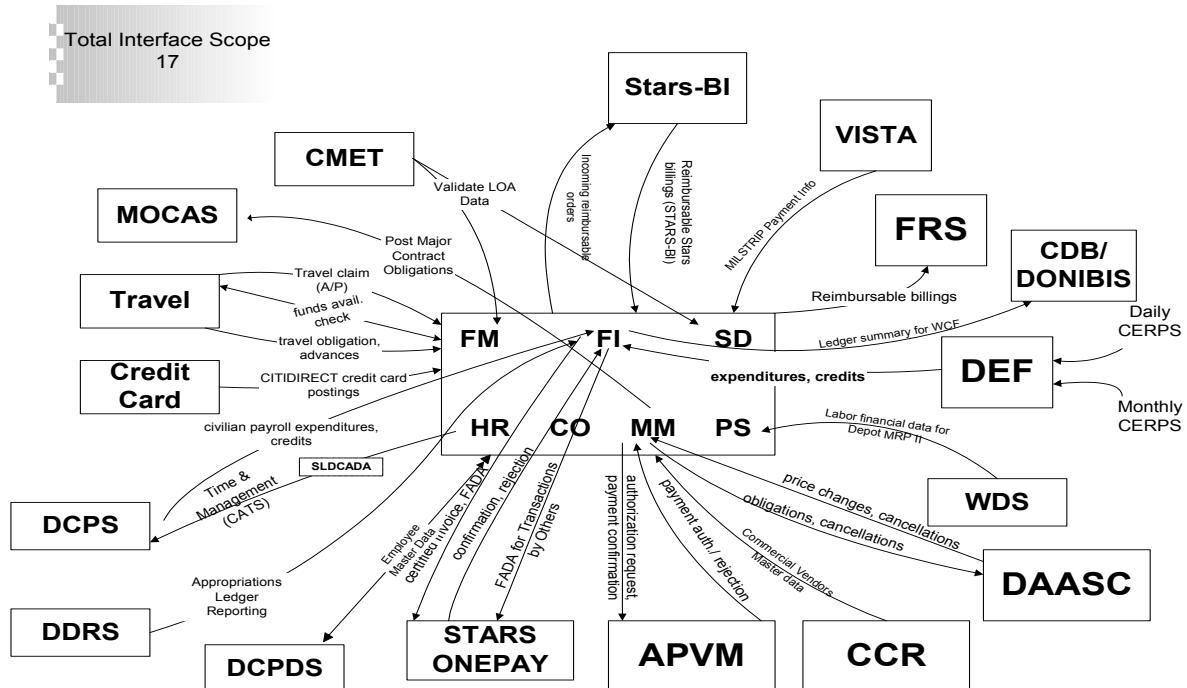


Figure 2. Interfaces - Version 1.0.

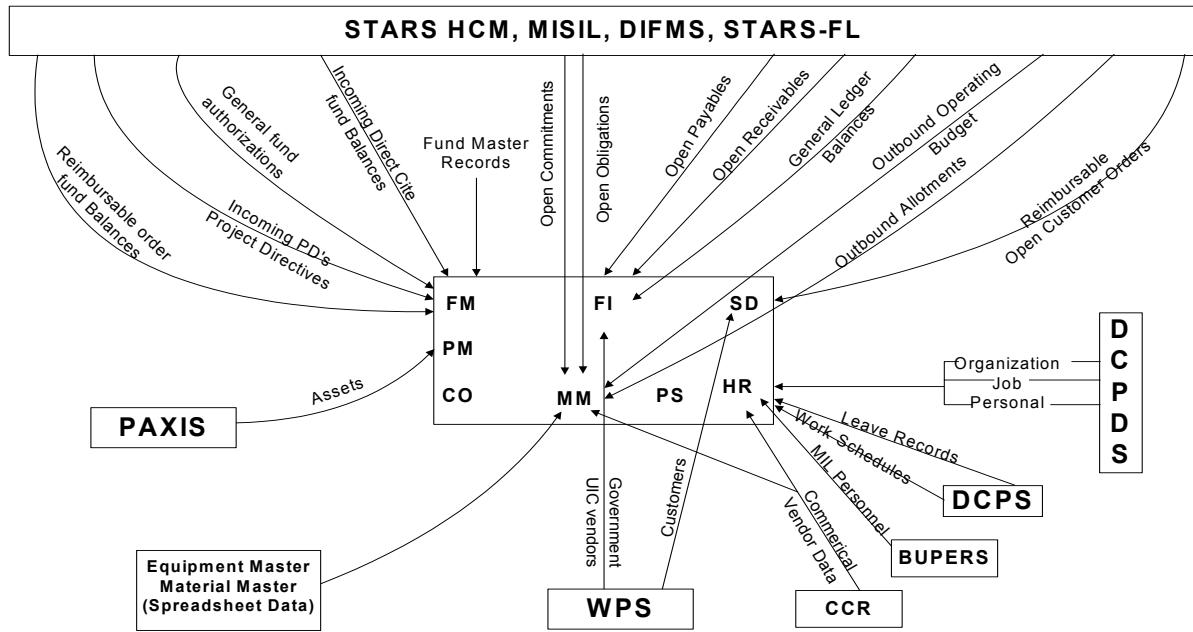


Figure 3. Conversions – Version 1.0.

During this Gap/Fit assessment, there appeared to be a high degree of overlap in NPS requirements for conversions and interfaces with those planned for NAVAIR.

Systems applicable to NPS already in scope for the NAVAIR ERP project are: STARS FL (conversion), Travel Manager 7.1C, Defense Civilian Payroll System / Standard Labor Distribution Application, Modern Defense Civilian Personnel System, Bureau of Naval Personnel.

The cost of these interfaces is based upon the code being available in the NAVAIR SAP instances and not requiring adaptation for NPS. If these interfaces are delayed at NAVAIR or if they require extensive modifications for NPS, this could impact schedule and pricing for the NPS ERP project.

As discussed, further investigation is needed during the Blueprint Phase to determine how to deal with the following NPS legacy systems: DPAS, POWERTRACK, ANSRS / SPS, PARIS...

An initial assessment of NPS legacy systems to be shutdown includes: STARS FL, FASTDATA (used to update STARS FL), DORS (online reporting system), DMAS (stand-alone system used by the departments to account for research projects), E-TAC (stand-alone timecard system), ANSRS (purchase requisitions > \$2500)...

4. “Bolt-On” Products

- Planned “Bolt-On” products for SIGMA Version 1.0 currently include
 - Webmethods / MQ Series – Middleware
 - JetForms – Forms Management/Development
 - Oros – ABC Cost Modeling
 - ePower – Workflow/Document Management

NPS would likely leverage use of the middleware product and JetForms for forms management and development. Oros (used to support activity-based costing) and ePower (document management) will not be in scope for NPS, at least in the first ERP phase.

G. TRAINING AND CHANGE MANAGEMENT

In addition to functional and technical expertise, the KPMG Consulting methodology includes training and change management support to facilitate a smooth transition for NPS into an ERP environment.

1. Change Management Approach

Successful implementation of the SAP solution across NPS will require much more than “good planning” and “the right technical solution.” Complex integration efforts require cooperation across internal organizational areas due to the interdependencies and “touch points” among those areas. A change management approach is “baked” into each step of the ASAP Methodology from Project Prep to Go-Live and Support, to ensure the organization is ready for the transition and the workforce is equipped with the right skills. The Gap/Fit Assessment revealed that the business processes at NPS would change significantly under the ERP environment. Most of this is driven by NPS’s desire to re-define some of their core business operations to a more efficient model within SAP. Adapting to the resulting tools and business processes will require an order of magnitude change in the roles, skills and behaviors of NPS users, requiring them to make decisions and share information in new ways across the organization.

Change Management issues identified by participants in the Gap/Fit sessions include:

Identified Gap	Issue
Communication	The SAP initiative must be effectively communicated across NPS in order to facilitate acceptance. Previous technology changes have not been supported by a comprehensive communications approach
Changes to job roles	Adapting business processes to the new functionality will result in significant role changes for key users. Government requirements pertaining to role changes and transfers create a layer of complexity that must be accounted for
NPS readiness for change	Multiple strategic initiatives, occurring in tandem, will tax an already change-weary organization and create risks for the SAP program if a strong change management and transition approach is not in place
Training	Training will be essential to successful rollout of SAP, yet currently no delivery infrastructure exists. This will be addressed by the ASAP training strategy

Table 17. Identified Gap Issues.

The KPMG Consulting Team will include functional experts that understand the unique needs imposed by the confluence of Navy-driven systems and the dynamic requirements of an academic institution. Understanding these issues will enable the core team to build a change plan that bridges the gap between the functional and technical aspects of this transition while addressing NPS' unique needs.

The change management approach encompasses four focus areas, with actions that bridge the key gap issues identified above:

- Communications Plan – Engage those most likely to be affected by the changes or to influence program success in order to surface ideas and concerns early. Develop a guiding coalition of leaders aligned on program goals and approach. Our Change Management/Training Lead will work with NPS leaders to establish a two-way communications framework that properly positions the initiative and ensures that the right messages are communicated about the project.

- Organization Impact & Readiness Assessment – Assess the impact of the solution on the organization and its people, and monitor the organization's readiness for change. Identify impacts to roles and work processes. Define required skills & competencies for new/revised jobs. Conduct training needs & gap assessment. Analyze HR programs, such as performance management, rewards systems, and new hire training programs to promote alignment with new operating environment (Not in the first phase for NPS' SAP implementation). Workforce Transition Strategy – Prepare and equip the workforce with the skills to be successful at Go Live. Taking into account the complexities of the General Schedule (GS) human resources policies, develop detailed transition plans and supporting HR policies to move employees into new/revised roles in a planned, well-communicated fashion that minimizes disruption to the organization.
- Training – Training supports a successful implementation by ensuring that users understand both the tools and the new business processes that they will work with daily. An effective training program starts with a comprehensive Training Strategy that defines scope, approach, target audiences, required resources, delivery method, and logistics considerations for the SAP training effort during Phase 4, Implementation. The recommended training approach is detailed in the following pages.

The Integrated Change Management Approach is illustrated below:

Change Management Activities Are Embedded in the ASAP Lifecycle

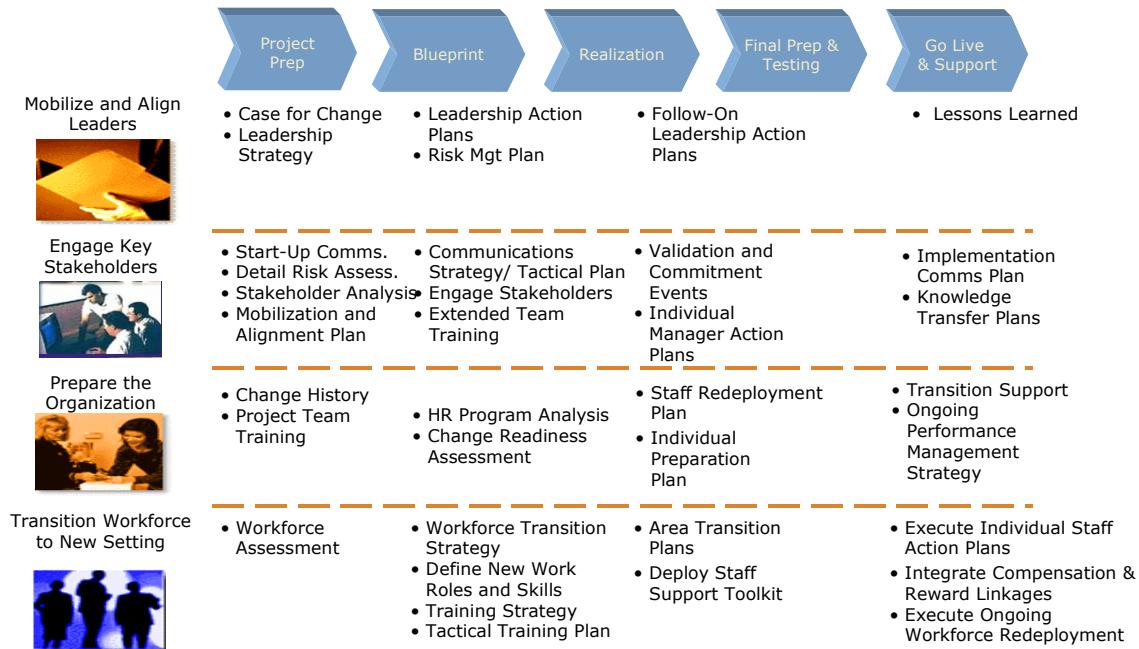


Figure 4. Change Management.

During transition planning and implementation, the KPMG Change Management/Training lead will work closely with project team members and NPS advisors to identify and develop local transition teams whose responsibility will be to ensure readiness among assigned constituencies by facilitating communications, developing transition plans, and assisting with training coordination and compliance, using tools and approaches developed by the core team and Change Management / Training lead.

2. ASAP Methodology: Training

Core team and end-user training is an essential component of the change management strategy. The best technical solution available will not be optimized without adequate training and post-implementation support to ensure users are prepared to perform their jobs using the new tool and business processes. As discussed during the Gap/Fit Assessment, training and change management are both integrated into the ASAP methodology for ERP implementation. The training approach is highlighted below.

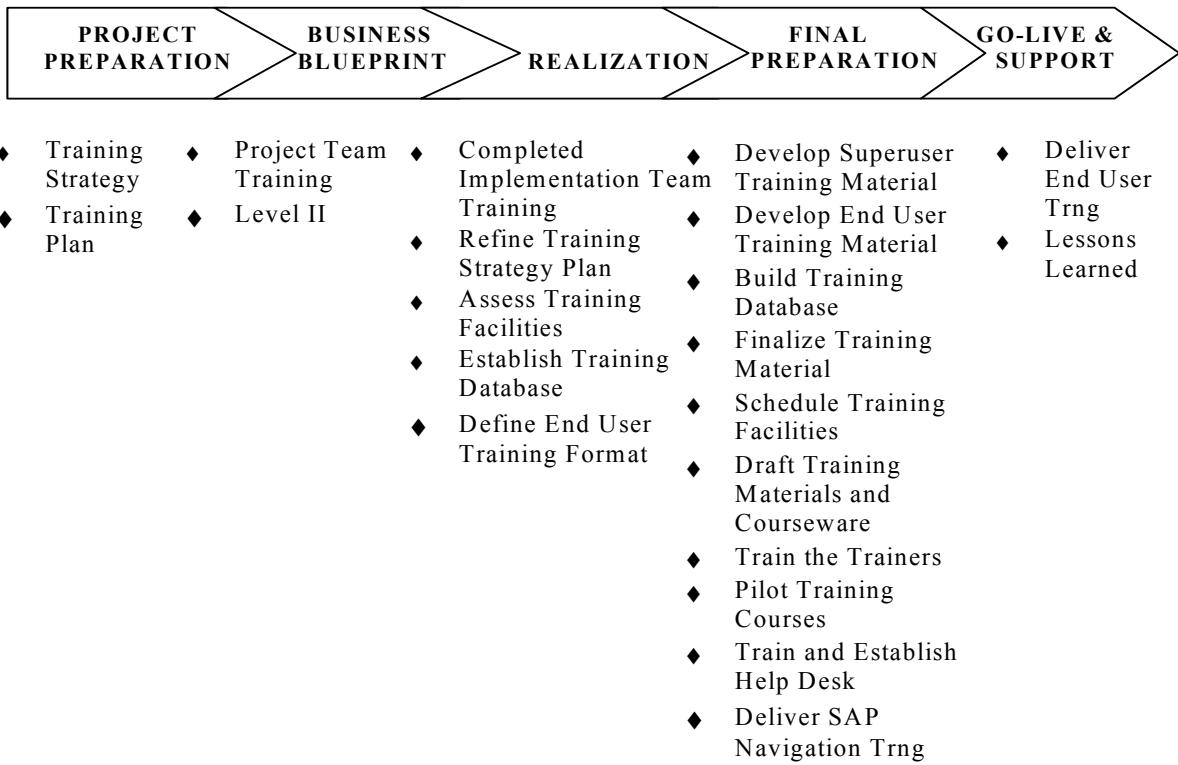


Figure 5. Change Management and Communication Plan.

3. Implementation Team Training

The initial training requirement at NPS will be focused on the Implementation Project Team. As discussed during the Gap/Fit Assessment, the NPS implementation team must be identified immediately and committed to a schedule that supports the implementation timeline. Implementation Team Training is offered at three levels, based on the individual's role within the NPS Implementation Teams, and exposure to these applications in the daily business environment:

- KPMG / SAP Level I Training - Introduction to SAP and the KPMG Approach. KPMG consultants deliver this half-day to one-day training during the Project Preparation Phase.

KPMG / SAP Level II Training - Two Parts:

- Introduction to SAP Modules - covering terminology, capability and functionality
- In depth Module Training - greater detail in module functionality to support process definition and how to configure the software ("set switches") to support new processes.

KPMG consultants deliver this training during the Blueprint Phase. This training typically is performed in 2 days per module.

- SAP Level III Training - Technical & Functional Support Training. This includes three "tracks":
 - System Administration (Basis)
 - Technical Development (ABAP)
- Configuration / Module Training:

Level 3 training is typically delivered directly by SAP. It is not required for NPS to attend Level 3 training in order to complete the implementation project.

During the Preparation Phase, NPS will identify the 10 (estimate) personnel to receive Level I – III training and work with KPMG Consulting as part of the ERP Implementation Team. The NPS Implementation Team will define the new business processes and guide the organization through implementation. In addition to the core implementation team receiving up to Level III training, selected key organizational personnel will require Level I and/or Level II training. Recognizing the organization's leadership, such as the Superintendent, CIO, and Comptroller will not be part of the implementation team, their involvement in the decision making process may necessitate

Level II training. Additionally, it was determined during the Gap/Fit Assessment that a larger audience of NPS professionals would benefit from participating in Level I training.

4. End User Training

The KPMG Consulting approach covers the range of training requirements for organizations moving to an ERP environment. The training provided will address both new business processes as well as the new software tools offered by the ERP application.

The approach is characterized by best practices in ERP training delivery:

- Training is role based versus transactional
- A train-the-trainer approach is used to deliver training
- Training is just in time to aid maximum retention and immediate application of skills
- Provision of post-implementation support to ensure a smooth transition

To most efficiently train the organization, NPS training will be based on the role people have in the organization, specific to the transactions for which they are responsible, and defining how these transactions fit within the overall process. A role based training plan develops courses that are specific to the roles the workforce at NPS will have to fill upon transition to ERP applications. The users role and the specific business function scripts on which they will be trained are defined and supported by the new documented end-to-end business processes that are developed under the ERP environment.

After new business processes are defined, a training program will be developed to orient the NPS end-users to these new processes. After they are understood, the training process can incorporate ERP system usage with the new business process. Given the significant change in business processes that the ERP transition will bring to NPS, it is critical that the total user population is defined and the appropriate level of training is offered. NPS will require that some level of End-User training be offered to personnel.

In the “Train the Trainer” approach, we assume that the KPMG Consulting consultants will train the core team and “super users” selected from each functional area that will be impacted. These super users will deliver training to the end users. The “Train the Trainer” approach is effective because:

- This approach builds strong NPS knowledge and skills for each functional area
- They reside in the functional areas; the super users can provide ongoing support to local users after the system “go-live” and solve many problems internally before they get escalated to core team. This frees up core team members to focus on rolling out the system to other sites.
- Based on the proposed NAVAIR ASP model, the level of services provided under that arrangement would determine additional training requirements. Given the size of NPS relative to NAVAIR, the ideal arrangement would include Help Desk support. If the NAVAIR arrangement does not provide Help Desk access, NPS will require Help Desk Overview Training similar to that planned for the Information Management Depot (IMD) Help Desk.

The training material for all courseware will be developed by the KPMG Consulting team, using the NPS Business Function Scripts and End-to-End Business Process Charts as the baseline for developing role based content to fit the needs of the organization’s user audience. The content for each training course will be tailored to the user, and address the specifics of NPS’s core operations. This is to ensure that the training is related to the actual user tasks and will result in preparing them to successfully perform all the daily tasks within their job description. In addition to the custom content training tailored for NPS, a library of SAP Computer Based Training packages will be made available for self-study on the capabilities and technology of this application.

Note that about 80% of the NPS end-user training material will be based on NAVAIR’s training material.

5. User Population and Location

NPS training will be conducted at NPS facilities in Monterey, CA. NPS will provide the required facilities and support for these training sessions. At a minimum, these facilities will require workstations and Internet access.

Based on the Gap/Fit Assessment the number of power users is estimated between 200 and 500. Estimated populations by module are indicated below:

Module	Number End Users by Function
HR	Human Resources – 12
Finance	Comptroller's Office – 50
Project Systems	Financial Analysts (new roles to be instituted in various academic departments) -apx. 10 Research Office - apx 10 Strategic Planning Directors: 6 Selected principal investigators - 10
Materials Management	Supply Technicians – 10 Inventory and Procurement process owners - 3 TBD - current procurement card holders - 70
Management Reporting	Strategic Planning Directors -6 Research Office: 2-3 Comptroller (management level)- 5 HR (management level) -5 Deans - 4 Superintendent/Deputy/Provost –3

Table 18. Number of Users By Function.

If NPS decides to implement employee and manager self service applications in connection with HR functionality, the user training population will increase significantly from the estimates reported above.

H. NEXT STEPS – IMPLEMENTATION APPROACH

1. Assumptions

In order to define a detailed implementation approach dealing with staffing, scheduling and costing, the following assumptions were made for the NPS project:

- Project team will be based in Monterey, CA
- NPS will provide administrative support, PCs and facilities for the project team
- Leverage from the NAVAIR ERP Model will be maximized
- NPS will use the NAVAIR ERP environment as an ASP (Application Service Provider)

- NPS go live date with SAP is scheduled for February 1, 2003
- NPS data related to ERP is unclassified
- Appropriate resources will be allocated to the project: refer to staffing recommendations (3.4.)
- Estimated count for SAP end-users at NPS is between 200 and 500.

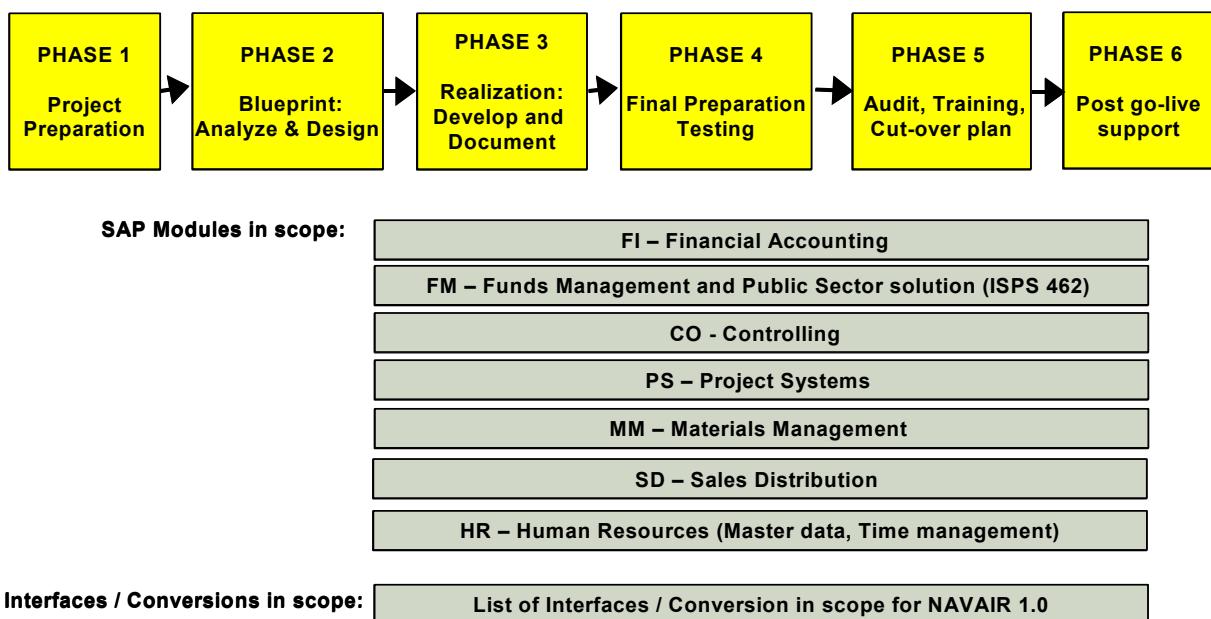


Figure 6. Project Plan.

The proposed project plan is based on the ASAP (Accelerated SAP) implementation methodology. Detailed activities related to each phase will be explained during the kickoff meeting for the project.

The NPS project will be split into 6 phases:

- Phase 1: Project Preparation (including Level 1 SAP training). During this phase, the project is launched, project facilities prepared, project team mobilized and top leadership engaged
- Phase 2: Blueprint (including Level 2 SAP training). During this phase, the TO-BE processes and Concept of Operations for NPS are designed
- Phase 3: Realization. Main activities during this phase include SAP configuration, and specification, build and unit test of interface / data conversion programs and documentation
- Phase 4: Final Preparation. During this phase, the configured system is fully integration tested to ensure it meets the NPS business requirements

- Phase 5: Audit, Training and Cutover Plan. This period will be dedicated to end-user training, defining a cutover plan and performing an official audit of the SAP system if required (e.g. FMO)
- Phase 6: Post Go-Live Support. Once NPS goes live with the SAP system, support will be provided during this phase. A best practice is usually to support the client until the first month-end closing is completed.

2. Project Timeline

The recommendation to implement SAP at NPS based on the NAVAIR solution is based on the following option:

- 11-month implementation: April 1, 2002 – February 28, 2003. Go-Live: February 1, 2003. In this scenario, NPS would adopt the NAVAIR solution ‘as-is’ with little change allowed for the SAP configuration. Core implementation activities would include the creation of the required NPS organization structures and aligning the NPS business processes to the current SIGMA Version 1.0 baseline configuration. Discrepancies between NPS requirements and NAVAIR model will be identified during the Blueprint Phase. To accommodate an 11-month implementation, the combined project team would be 100% dedicated to the project starting 01 April 2002. Post implementation support would continue through mid-March, 2003.

Detailed information supporting this option is provided hereafter.

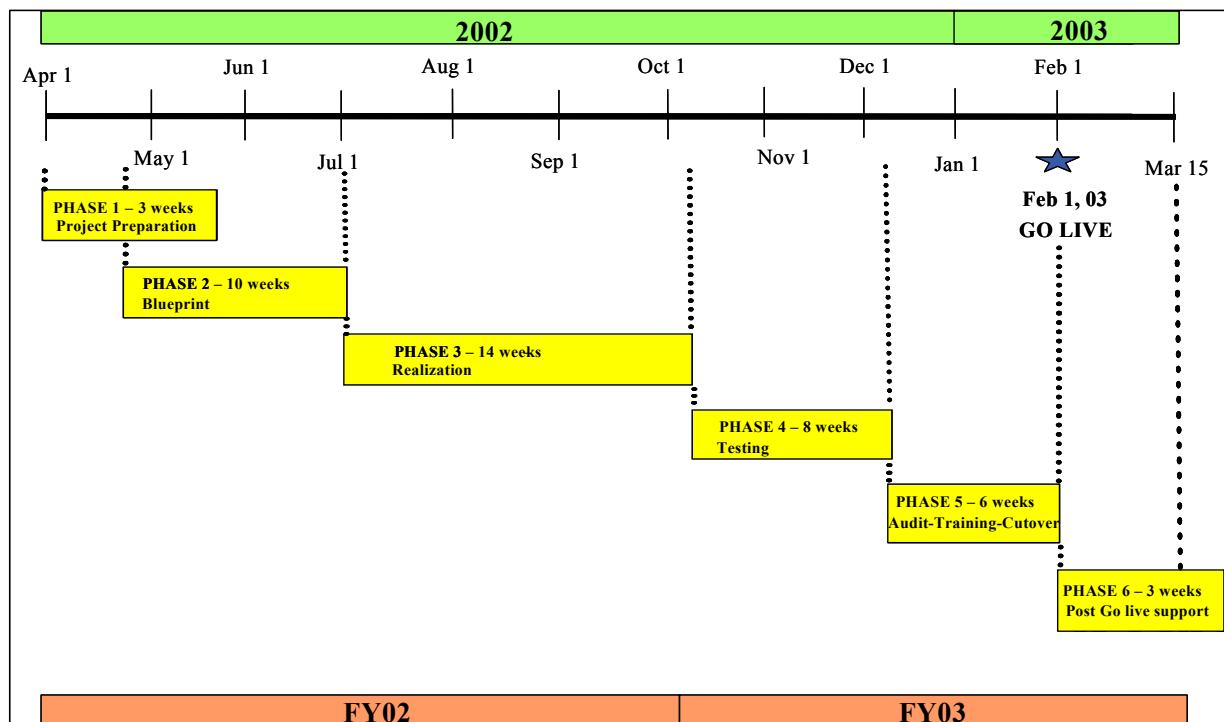


Figure 7. Timeline.

The proposed project timeline is based on the following assumptions: Project officially starts April 1, 2002.

- The Project Preparation Phase of the project can be completed in 3 weeks
- The Blueprint Phase would start April 22, 2002.
- The Go Live date is scheduled for February 1, 2003. It would take 10 months to go live.
- Post Go Live support is provided until mid – March 2003
- Taking these assumptions into consideration, the proposed project plan is:
 - Phase 1 - Project Preparation: 3 weeks between April 1, 2002 and April 19, 2002 with ALL resources (NPS and KPMG) involved full time
 - Phase 2 – Blueprint: 10 weeks between April 22, 2002 and June 28, 2002
 - Phase 3 – Realization: 14 weeks between July 1, 2002 and October 11, 2002
 - Phase 4 - Final Preparation (testing): 8 weeks between October 14, 2002 until December 6, 2002
 - Phase 5 - Audit, Training and Cutover Plan: 6 weeks between December 9, 2002 and January 31, 2003
 - Phase 6 - Post Go-Live Support: 3 weeks between February 3, 2003 and March 15, 2003

The graph below indicates the alignment of resources (NPS and KPMG Consulting) with the different phases of the project:

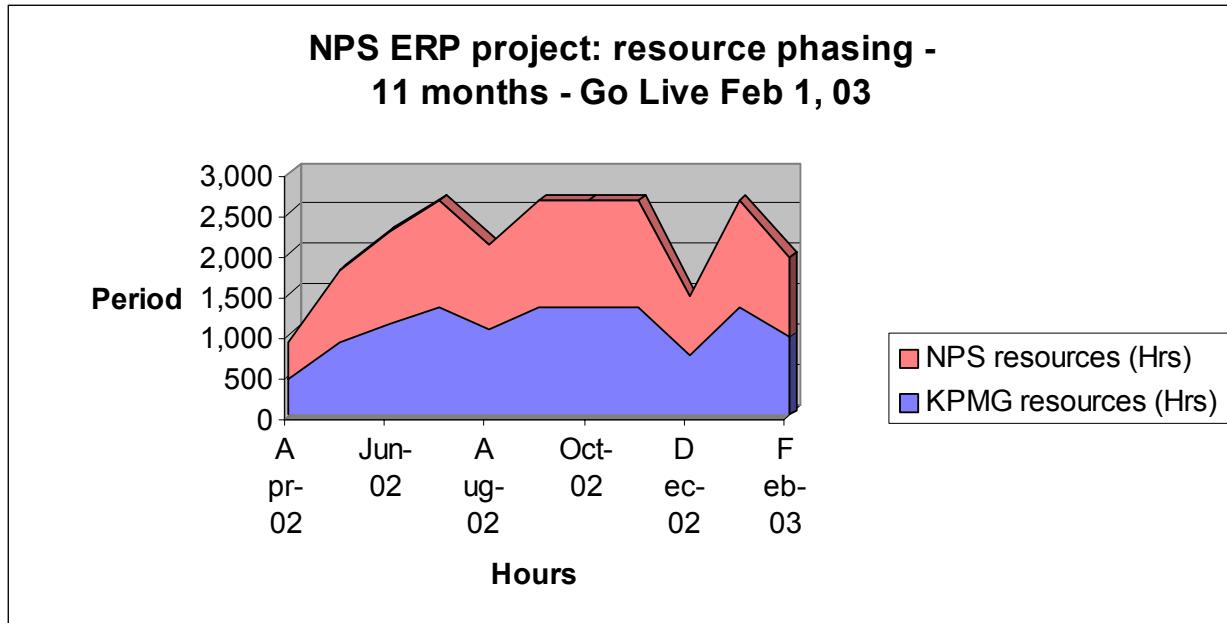


Figure 8. NPS ERP Project Plan.

The following information is important to better understand the chart:

- One-week vacation has been planned in August 02
- Two weeks off in December 02
- A best practice is usually to assume that resources provided by NPS would be twice the resources provided by KPMG Consulting, despite NPS's constraints in allocating resources to this project. Part-time NPS involvement and more flexibility may be required depending on the project phase

A minimum of 9-10 full time NPS people are required to conduct a successful SAP implementation.

For more information regarding the number of resources, refer to the next section (3.4.).

3. Project Organization and Staffing Requirements

Below is proposed project organization for NPS.

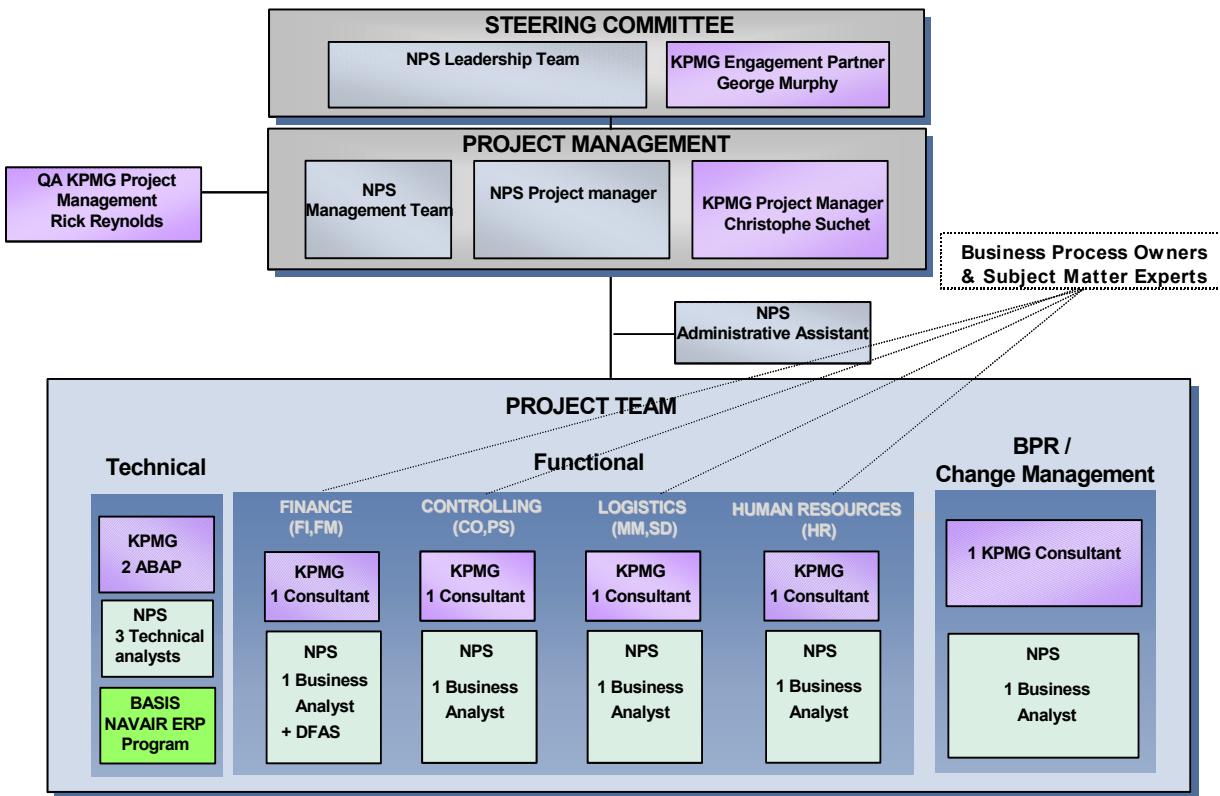


Figure 9. Organization For ERP.

This organization is typical for an ERP project. It can be divided into 3 key structures:

- The Steering Committee, which is involved in the key decisions required for the project. The Steering Committee usually meets once a month or on an as-needed basis
- The Project Management team, which manages the project's daily activities of the project
- The Project Team split into 3 categories
 - Technical team dealing with ABAP (SAP programming) and BASIS (technical SAP infrastructure)
 - Functional teams organized around SAP modules. Five teams are proposed: finance (FI, FM), controlling (CO), project systems (PS), human resources (HR) and logistics (MM, SD)
 - BPR (Business Process Reengineering) and Change Management team

These teams have the following roles and responsibilities:

a. Steering Committee

Resolve major policy issues.

- Inform project team of policy issue changes that may impact the success of the implementation
- Help set overall project objectives and success criteria and maintain consistency
- Provide positive, visible support to the project
- Address scope/budget issues

b. Project Management Team

- Maintain an environment that promotes an efficient and healthy working relationship
- Manage development and tracking of detailed plans
- Manage the functional, geographic and organizational scope
- Control scope of team activities
- Ensure implementation procedures and standards are followed
- Ensure appropriate resources (funds, people, time) are allocated to the project
- Monitor progress against project goals and objectives
- Lead communication with Steering Committee and Project Team
- Direct activities of team members
- Help set and monitor personal career objectives for project team members

c. Technical Team (ABAP – Team Lead and Team Members)

- Ensure implementation procedures and standards are followed
- Ensure completion of documentation for technical processes and procedures
- Monitor progress against project goals and objectives
- Manage hardware supplier
- Schedule training for technical team
- Manage Network Vendor
- Manage requests for enhancements, interfaces, reports and conversion programs
- Ensure completion of documentation for enhancements, interfaces, reports and conversion programs

- Ensure unit testing for enhancements, interfaces, reports and conversion programs
- Monitor progress against project goals and objectives
- Schedule training for ABAP team
- Develop enhancements, interfaces, reports and conversion programs
- Document enhancements, interfaces, reports and conversion programs
- Unit test enhancements, interfaces, reports and conversion programs
- Initiate transport of programs into applicable environment(s)

d. Functional Teams (Team Lead and Team Members)

- Manage cross-functional/integration issues
- Resolve and/or escalate issues
- Communicate to project team members
- Help resolve issues
- Lead and participate in redesign activities
- Ensure the quality and accuracy of all activities associated with the implementation process
- Function as Business Analyst (provide detailed process/functional knowledge)
- Provide detailed knowledge of operational practices and procedures
- Help resolve issues and provide for alternatives
- Document business requirements and business functions
- Document enhancements, interfaces, and reporting requests
- Help train end users
- Lead testing process
- Develop user procedures
- Ensure the quality and accuracy of all activities associated with the implementation process

e. BPR / Change Management Team

- Help reengineering the business processes
- Communicate about the project across the organization
- Define and structure the end-user training requirements

The following assumptions have been made to define the number of resources required for the project:

- High reusability of the NAVAIR design, which reduces the number of consultants. A standard SAP project would require at the minimum one or two consultants for each SAP module. This case requires 4 consultants instead of 7 – 14 to implement the FI, FM, CO, PS, MM, SD and HR modules.
- NAVAIR will provide and manage the SAP infrastructure for NPS (ASP). As a result, no BASIS resources (NPS, KPMG) are planned. The level of integration with the NAVAIR ERP project to support NPS will have to be further discussed.
- NPS resource requirements are mostly based on a 1:1 ratio compared to KPMG Consulting resources. A best practice with ERP implementations would be a 2:1 ratio. Client's resource involvement is always a key success factor for the project. Some flexibility can be allowed with NPS depending on the phase of the project. As stated earlier, NPS's constrained in its ability to dedicate resources to this project.

A summary of the resource requirements is contained in the following table.

Project Structure	KPMG Consulting resources	NPS resources
Steering Committee	Part-time Managing Director	Part-time NPS leadership
Project Management	1 Part-time QA Project Manager 1 Full time Project Manager	Part-time NPS leadership 1 Full time NPS Project Manager
Technical	2-3 full time ABAP resources	3 FT NPS Technical Resources
Functional	4 full time Consultants	4 FT NPS Business Analysts
BPR / Change management	1 full time BRP / Change management Consultant	1 FT NPS Change Management Analyst

Table 19. Resource Requirements.

Note that the involvement of some resources (e.g. ABAP) varies depending on the project phase.

4. License Costs

Based on the scope of business processes and SAP modules identified in this Gap/Fit, software license costs have been identified as follows, leveraging from existing NAVAIR agreements:

- SAP/R3 - \$874 per seat (NAVAIR-negotiated price)
- Middleware – Estimated: no cost to NPS. This is part of the integration model with NAVAIR
- JetForms – Estimated \$30,592
- The JetForms software is site-based forms development and management software, which operates on the local area network

5. Project Costs

Based on the assumptions and content of this Gap/Fit Analysis, project costs for the implementation of the SIGMA Version 1.0 scope for NPS is as follows:

- License Fees
 - SAP/R3 – estimate based on \$874/seat and 18% fee for annual maintenance
 - TOTAL SAP LICENSE FEES – 200 USERS: \$174,800 + \$31,464 (maintenance)\
 - TOTAL SAP LICENSE FEES – 500 USERS: \$437,000 + \$78,660 (maintenance)
 - JETFORMS – ESTIMATE \$ 30,592

6. IMD Support Fees for NAVAIR to Serve as ASP Model

FEES ARE TO BE NEGOTIATED WITH NAVAIR. As stated earlier, KPMG Consulting is currently in discussions with the NAVAIR with respect to providing support for the NPS ERP program. NAVAIR has agreed in concept to support this environment. Final negotiation has to take place between NPS and NAVAIR.

An initial estimate for the ASP fee is \$ 150 / user / year.

TOTAL NAVAIR ASP FEES – 200 USERS: \$30,000

TOTAL NAVAIR ASP FEES – 500 USERS: \$75,000

7. Integrator Fees

The following estimates are calculated assuming the scope limitations described in the scope document. Based on the 11-month implementation timeline for the project, the integrator fees would be: TOTAL INTEGRATOR FEES: \$2,525,767. Estimated fees are inclusive of travel and expenses. Integrator fees can be split as the following:

Phase	From / To	KPMG Fees
1. Project Prep	April 1, 02 - April 19, 02	\$51,600
2. Blueprint	April 22, 02 - June 28, 02	\$481,562
3. Realization	July 1, 02 - October 11, 02	\$854,331
4. Testing	October 14, 02 - December 6, 02	\$530,347
5. Training, Cutover	December 9, 02 - January 31, 03	\$399,097
6. Post golive	February 1, 03 - March 15, 03	\$208,831
		\$2,525,767

Table 20. Integrator Fees.

8. Cost Summary

The following tables provide a cost summary for the SAP implementation considered for the NPS project. Note that NPS will have to plan in the course of the project for additional costs related to Defense Finance Accounting Services (DFAS) charging fees for file changes, archiving etc.

COST ESTIMATE	200 NPS USERS	500 NPS USERS
Integrator Fees (incl. Expenses)	\$2,525,767	\$2,525,767
SAP R/3 licenses - est. \$ 874 / user	\$174,800	\$437,000
SAP maintenance fee - est. 18%	\$31,464	\$78,660
Jetforms - est.	\$30,592	\$30,592
NAVAIR Fees (ASP) - est. \$ 150/user/year	\$30,000	\$75,000
TOTAL	\$2,792,623	\$3,147,019

Table 21. Cost Estimate.

I. CONCLUSION

The 4-day Gap/Fit process reveals a high reusability of the NAVAIR ERP solution to address NPS business requirements. The estimate is that 80%+ of NPS requirements are currently accommodated within the NAVAIR SAP solution. Furthermore, most of the interfaces/conversions applicable for NPS are already developed or currently in development within the SIGMA Version 1.0 release. Finally, NAVAIR has agreed in concept to support an ASP environment for NPS.

IV. OPTIONS AND ALTERNATIVES

A. SUMMARY AND NPS ACTIONS

This thesis reviewed and evaluated the ERP Solution System currently in the Integration Testing Phase at NAVAIR and examined the benefits and cost that NPS could leverage by purchasing the system for approximately \$2.7M for 200 users or \$3.1M for 500 users. This thesis looked at the capabilities of the current NAVAIR SIGMA ERP Solution System, in terms of money and level of expertise. The research also looked at the alternatives and options to enable NPS to close the gaps to fit its current needs.

RADM David Ellison, Superintendent, wanted to explore the possibility of joining NAVAIR's ERP Solution System, currently under the Integration Testing Phase, as he believed it was an opportunity for NPS to leverage on this technology. As seen by senior management, the partnership with NAVAIR could benefit NPS, by acquiring and implementing an ERP at a fraction of the cost normally associated with this type of purchase. An additional benefit would be reducing the time associated with implementing an ERP System, normally between 3 and 5 years, to 11 months. Management also saw the advantage of benefiting from NAVAIR lessons learned, partnering with an activity that was familiar with ERP in a Navy setting, and conducting joint training. The primary benefits of acquiring the NAVAIR SIGMA ERP Solution System were:

- Accountability of all funded accounts.
- Procuring a single database for timely reports and information.
- Streamlining multiple feeder systems across the organization.

To further investigate the possibility of purchasing this system, RADM Ellison sent a delegation of five top management officials to have a first hand look at the NAVAIR SIGMA ERP Solution System. Upon returning from NAVAIR, the management officials recommended that NPS not invest in the joint venture with NAVAIR. The main considerations were:

- NAVAIR has millions of dollars in a Negative Unliquidated Obligations (NULO) fund. NPS NULO balances are no more than 50K in a 5-year period. This amount is considered to be relatively small. Management officials felt that the scope of NAVAIR's reasons to purchase an ERP were not justifiable reasons for NPS purchasing an ERP system.

- The KPMG price for leveraging with NAVAIR SIGMA ERP Solution Systems was \$2.7M for 200 users or \$3.1M for 500 users. NPS had been given \$2M, as part of the Administrative Functionality Assessment Implementation Package, and the possibility of using these funds to purchase an ERP system were explored as a way to achieve the command's most efficient organization. \$2.7M exceeded the amount NPS had budgeted.
- Without knowing the outcome of the full implementation at NAVAIR, the management team felt it would be premature for NPS to invest in the SIGMA ERP Solution System.

B. FINDINGS

Information was presented in two chapters. Chapter II provided an overview of the history and background of ERP, identified private sector organizations currently using ERP, examined the history of NAVAIR ERP SAP pilot process, identified government agencies currently using ERP and reviewed NPS interest in instituting an ERP system. Chapter III covered data such as the annual cost of running current NPS Programs and reviewed KPMG Gap Fit Analysis for Instituting an ERP system at NPS.

The primary research question that this thesis investigated was given the capabilities of the current NAVAIR SIGMA ERP Solution System in terms of money and level of expertise what are the possible alternatives to close the gap to enable it to fit the current needs of NPS's ? One such alternative would be that NPS needs to investigate DPAS, POWERTRACK, ANSRS and PARIS. These systems make up 20% of the NPS Legacy Systems that are not compatible with NAVAIR's System. NPS should consider acquiring waivers to use systems that have been created for NAVAIR that mirror the functions currently performed by NPS systems. NPS will need to focus appropriate resources on this 20% gap (often the most critical part of a package implementation), rather than the initial expenditure required to leverage on the NAVAIR SIGMA ERP Solution System. The Gap Fit Analysis estimates that 80%+ of NPS requirements are currently accommodated within the NAVAIR SAP solution. Furthermore, most of the interfaces/conversions applicable for NPS are already developed or currently in development within the SIGMA Version 1.0 release. NAVAIR has agreed in concept to support an Application Service Provider environment for NPS.

The secondary research questions that this thesis investigated were:

- What is the background and history of ERP? In the 1960's, the focus was on inventory control. Most of the software packages (usually customized for a specific type of hardware from a specific vendor) were designed to handle inventory based on traditional inventory concepts. In the 1970's, focus shifted to MRP (Material Requirement Planning). Many companies kept raw materials in stock and had a simple re-ordering system: if the inventory dropped below a minimum stocking quantity or re-order point they would buy more inventory, usually using a re-order quantity. The system worked well for most companies, since product changes and production plans remained constant. In the 1980's, the concept of MRP-II (Manufacturing Resources Planning) evolved, which extended to shop floor and distribution management activities. These systems would forecast shortages and ordering times for components and other raw material based on base sales and marketing data. In the early 1990's, MRP-II was further extended to cover areas like Engineering, Finance, Human Resources, Projects Management and the overall activities within a business enterprise. Hence, the term ERP (Enterprise Resource Planning) was coined. In addition to system requirements, ERP addresses technology aspects, such as client/server-distributed architecture, and object oriented programming. These are based on the idea that seamless integration is essential to provide visibility and consistency across the enterprise. Prior to ERP systems, companies stored important business records within many different departments. Each department often used different systems and techniques to manage that information. Within an organization, information was often duplicated without necessarily being identical or similarly up-to-date. The unified nature of an ERP system can lead to significant benefits; including fewer errors, improved speed and efficiency, and complete access to information. If a manager or an employee has better access to information, they better understand what is going on in the enterprise so they make better business decisions.
- What other Universities use ERP? Over 200 universities use an ERP system. Most are enrolled in the SAP American University Alliance program that offers universities software and staff training that normally cost businesses hundreds of thousands of dollars. SAP provides the training version of R/3, which simulates a business environment and enables students to experience real-time management of a complex information driven company that manufactures and sells worldwide. Since R/3 integrates information systems within the company and interfaces with suppliers and customers, it also provides instructors with a tool that integrates business education across disciplines by, for example, allowing finance students to see how customers order management,

procurement, manufacturing and human resource management interface with financial reporting. The University Alliance not only gives instructors a cross-functional teaching tool, it gives students access to advanced software technology that enhances their marketability, and it gives firms employees who understand how business areas interrelate and have specific IT skill sets.

- What is the level of training that NPS instruction will need to support ERP? To most efficiently train the organization, NPS training will be based on the role people have in the organization, specific to the transactions for which they are responsible, and defining how these transactions fit within the overall process. After new business processes are defined, a training program will be developed to orient the NPS end-users to these new processes. After they are understood, the training process can incorporate ERP system usage with the new business process. The “Train the Trainer” approach assumes that the KPMG consultants will train the core team and “super users” selected from each functional area that will be impacted. These super users will deliver training to the end users. Given the size of NPS relative to NAVAIR, the ideal arrangement would include Help Desk support. If the NAVAIR arrangement does not provide Help Desk access, NPS will require Help Desk Overview Training similar to that planned for the Information Management Depot (IMD) Help Desk. The training material for all courseware will be developed by the KPMG Consulting team and the content for each training course will be tailored to the user, and address the specifics of NPS’s core operations. In addition to the custom content training tailored for NPS, a library of SAP Computer Based Training packages will be made available for self-study on the capabilities and technology of this application. 80% of the NPS end-user training material will be based on NAVAIR’s training material.
- What are the direct costs of acquiring ERP, leveraging on NAVAIR’s savings? Costs for 200 users will be \$2.7M, and for 500 users \$3.1M.
- What are the indirect costs of acquiring ERP, leveraging on NAVAIR’s savings? A minimum of 9-10 full time NPS people are required to conduct a successful SAP implementation. These include 1 full time NPS Project Manager, 3 full time NPS Technical Resources, 4 full time Business Analysts, and 1 full time Change Management Analyst.
- What are the current capabilities? NPS uses the Department Online Reporting Systems (DORS), a locally developed and supported system, to provide an overall balance sheet of all financial accounts. The DORS Administrator receives information from the Funds Administration and Standardized Document Automation (FASTDATA) Administrator once a

day, and updates DORS with personnel time and expenses, supply expenses, contract, credit card expenses, and travel expenses against a job order number (JON). The department users access the DORS database and obtain balances on their account/JON without the necessity of accessing multiple databases. However, a major issue is the fact that any debits made after DORS has been updated are not reflected in account balances for 24 hours. This allows for overspending and inaccurate account balances.

- What are the direct and indirect costs to maintain NPS's current systems? These include salary and equipment. The Information Technology Department has a billet requirement of 79 Computer Specialist/Clerks with pay grades ranging from GS-5 to GS-13. These individuals support all the physical computer equipment and network administration duties for Windows based and UNIX computers at NPS. Salaries plus fringe benefits are estimated at \$6.1 M. In addition G2 Travel Manager annual cost is \$127K, and Departmental Online Reporting System (DORS) annual cost is \$224K. The Information Technology Department reported spending \$46K in FY02 to replace existing servers for the programs currently in use at NPS. The office also reported replacing an average of two servers per year.

C. RECOMMENDATIONS:

This thesis, and, therefore, these recommendations are based exclusively on archival and opinion research. The recommendations cited here will require funding and in this time of regionalizing, Commercial Activities OMB Circular A-76, and downsizing, the funding for the recommendations listed below may not be readily available. However this research found that by purchasing an ERP system, NPS in the long run, would realize savings by reduced labor cost, decreased funds spent on NPS homegrown system and access real time reports which would eliminate account balances discrepancies. NPS should consider the following recommendations if approval is granted to institute an ERP system:

- Ensure Managers and Supervisors buy in and support an ERP system.
- Earmark training dollars to ensure successful ERP training. The dollar amount should be included as part of the total ERP expenditures.
- Contract out for administrative support for ERP Implementation team. Currently, staff and faculty are already on multiple initiatives and do not have the dedicated time that an ERP implementation would require.

- Approximately 500 users currently have access to NPS basic programs such as DORS, ETAC and Travel Manager. Recommend NPS purchase SAP solution for 500 users.
- Recommend NPS students in the Information Technology & Management (ITM) Curriculum work with Information Technology (IT) staff to integrate the latest technologies/methodologies and explore how they apply to practical working solutions and existing computer system programs. Actively involve NPS IT staff in the ITM curriculum, which would provide an opportunity for free training and sharing of experience.
- Review the possibility of joining NAVAIR's SAP solution for accountability of all funded accounts, procuring a single database for timely reports and information, and streamlining multiple feeder systems across the organization when NAVAIR has completed all testing and has fully implemented ERP. Recommend NPS review NAVAIR SAP solutions in FY05, the period scheduled for NAVAIR to have full ERP capabilities.

D. ISSUES FOR FURTHER RESEARCH

In the future, should NPS explore the possibility of joining the NAVAIR SIGMA ERP Solution System, issues for further research which should be considered based on the Gap Fit Analysis by KPMG are:

- Investigation of DPAS, POWERTRACK, ANSRS and PARIS. These systems make up 20% of the NPS Legacy Systems that are not compatible with NAVAIR's System. NPS should consider acquiring waivers to use systems that have been created for NAVAIR that mirror the functions currently performed by NPS systems. NPS needs to focus appropriate resources on this 20% gap (often the most critical part of a package implementation), rather than the initial expenditure required to leverage on the NAVAIR SIGMA ERP Solution System.
- Investigation of all additional charges associated with NAVAIR SIGMA ERP Solution System. KPMG has noted in their analysis that NAVAIR will charge a fee for help desk support which is an additional cost for NPS. Investigation should also involve DFAS for inquiry of the additional fees that will be charged for file changes and archiving to incorporate NPS into an ERP environment.
- Investigation of NPS connectivity to the Navy Wide Area Network (NAVWAN), which is the key to ensuring a proper SAP environment for NPS.

LIST OF REFERENCES

1. Anderegg, Travis. Scorecard System for World Class Enterprise Resource Management: For ERP. Resource Publishing, Apr 2000.
2. Bromwich, Adam T. Peoplesoft Hrms Reporting. Prentice Hall, 1999.
3. Business System Modernization, DLA Public Affairs, 2001, Commercial Software to Replace Legacy Systems. http://www.dla.mil/bsm/legacy_system.htm.
4. Buck-Emden, Rudiger. The SAP ® R/3 System: An Introduction to ERP and Business Software Technology. Addison-Wesley Pub, Dec 1999.
5. Clay, D. Why ERP? A Primer on SAP Implementation. McGraw Hill, Jan 2000.
6. Clemons, J. W. 1994. The Manufacturing Execution System: Facilitating People-Integrated Manufacturing. Proceedings of the Industrial Computing Conference ICS/94. Los Angeles, CA: ICS: 278-284.
7. Distler, Dennis. Presentation to Navy Acquisition Reform Senior Oversight Council, Enterprise Resource Planning. Enterprise Solutions Program Office (ESPO): 1- 49.
8. Doumeingts, G.; Vallespir, B.; Chen, D. 1995. Methodologies for Designing CIM Systems: A Survey. Computers in Industry. 25: 263-280.
9. Fox, M. S.; Gruninger, M. 1998. Enterprise Modeling. *AI Magazine* 19(3): 109-121.
10. Goldratt, Eliyahu. Necessary but Not Sufficient. North River Press Pub, Oct 2000.
11. Jendry, Robert. Baan ERP Business Solutions: Foundations for E-Commerce: Your Guide to Success in the Changing World of Information Technology. Premier Press Pub Corp, Oct 2000.
12. ICEIMT Special Interest Group. 1992. Enterprise Modeling: Issues Problems & Approaches. Hilton Head: ICEIMT.
13. Kateel, G.; Kamath, M.; Pratt, D. 1996. An Overview of CIM Enterprise Modeling Methodologies. In J. Charnes, D. Morrice, D. Brunner and J. J. Swain (eds.), Winter Simulation Conference 1996: 1000-1007.
15. KPMG Consulting, 2002. Naval Postgraduate School Gap Fit Analysis with NAVAIR ERP Project Version 1.0 2/5/2002: 1 – 49.

16. Koch, C., Slater, D., and Baatz, E. 1999. The ABCs of ERP.
http://www.cio.com/forums/erp/edit/122299_erp_content.html.
17. Nagata, T.; Nagata, Y.; Koshimitsu, H. 1993. Building a CIM System for Compound Plant: Utilization of Distributed Processing System. *Computers & Industrial Engineering*. 24(4): 561-569.
18. Norris, Grant. *E-Business and ERP: Transforming the Enterprise*. John Wiley & Sons, Jul 2000.
19. O'Sullivan, D. 1994. *Manufacturing System Redesign: Creating the Integrated Manufacturing Environment*. New Jersey: Prentice Hall.
20. Ptak, Carol A. *ERP Tools, Techniques and Applications for Integrating the Supply Chain*. CRC Press, Sep 1999.
21. Seo Youngwood, 1999. What is ERP?
<http://www.wings.buffalo.edu/academic/departments/som/student.htm>.
22. Shankarnarayanan, S. 1998. *ERP Systems -- Using IT to Gain a Competitive Advantage*. <http://www.expressindia.com/newads/bsl/advant.htm>.
23. Washington Technology, *Enterprise Resource Planning: NASA-Style*. Vol. 14, No. 12, pp. 1-3, 1999.
24. Welti, Norbert. *Successful SAP R/3 Implementation: Practical Management of ERP Projects*. Addison-Wesley Pub Co., 1999.

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